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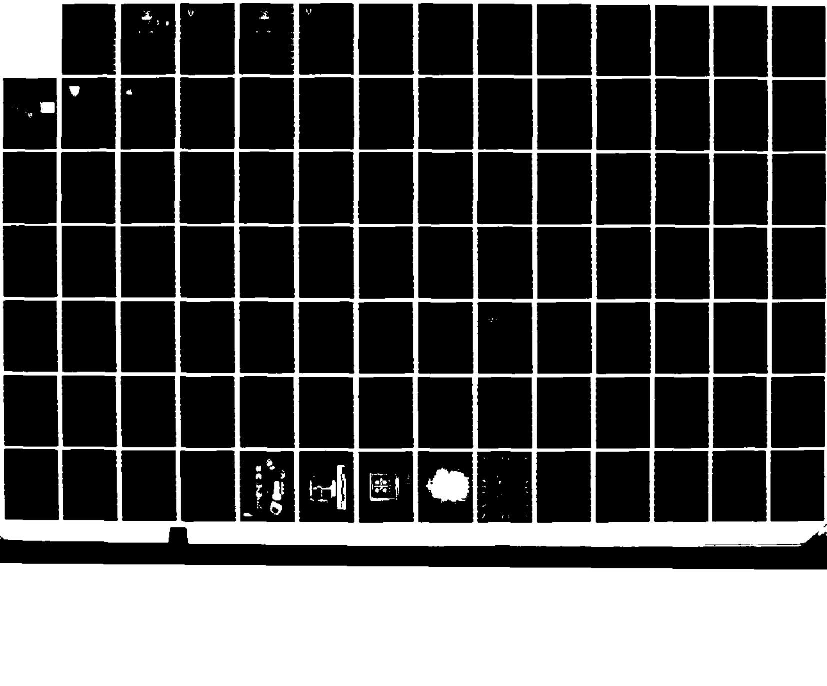

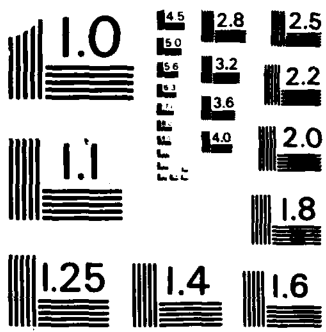

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PROCEEDINGS

TWENTY-SECOND ANNUAL MEETING

TECHNICAL DOCUMENTATION DIVISION

21-23 May 1980

U.S. Naval Station
Charleston, South Carolina

AMERICAN DEFENSE PREPAREDNESS ASSOCIATION
NATIONAL HEADQUARTERS: Union Trust Building, Washington, D. C. 20005

AMERICAN DEFENSE PREPAREDNESS ASSOCIATION

DEDICATED TO PEACE WITH SECURITY THROUGH DEFENSE PREPAREDNESS

ROSSLYN CENTER, SUITE 900, 1700 NORTH MOORE STREET, ARLINGTON, VIRGINIA 22209
703 522-1820

Founded 1919

Dear Fellow ADPA Member:

Your response to this questionnaire is requested to help us identify problems with Technical Documentation in the defense industry. The Technical Documentation Division is proud of the close and effective relationship between its industry and government members. It is through this relationship that we can identify and resolve problems for the simplification and improvement of Technical Documentation. Your participation is essential.

Please take a few minutes, complete the following questionnaire, and mail it to:

T. L. Golmis
Hughes Aircraft Company
Bldg. 604, M/S F-122
P. O. Box 3310
Fullerton, CA 92634

---

1. What feature or talk given at the 1980 meeting was the most informative? ______________________

   . . . Helpful to you? ______________________

2. What problems are you having that you would like to see resolved?

   ____

   ____

3. What subjects would you like to hear discussed at the 1981 meeting, tentatively to be held at the US Air Force Academy, Colorado Springs, Colorado ______________________

   ____

Your answers will be reviewed by the TDD Executive Board. Where necessary, ad hoc committees of industry and government members will be created to work your problems.

Sincerely,

T. L. Golmis

T. L. Golmis
Chairman,
Technical Documentation Division

TLG/cvc

P.S.: Comments and suggestions are invited on the back or additional sheets.

PROCEEDINGS

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THE MISSION

OF

THE AMERICAN DEFENSE PREPAREDNESS ASSOCIATION

The American Defense Preparedness Association exists solely for the advancement of adequate national defense of the United States in the fields of weapons technology, production, and logistics. We strive to improve the effectiveness and efficiency of the Government-Science-Industry relationship in the development and production of weapons and weapons systems. Our field of interest covers all ordnance, armament, weapons, weapons systems, and related equipment for the Armed Forces of the United States. Our interest also includes techniques, processes, and materials that have wide application in the development, production, and logistics of weapons.

Through its publications and meetings--national, local, and technical--the Association endeavors to educate its members and the public on problems affecting weapons preparedness. Our technical divisions provide advice to Government agencies on weapons technology.

The Association, founded in 1919, is a non-profit and non-political organization. It is an association of individuals as distinguished from an organization of commercial companies. The ten persons nominated by company members participate as individuals.

It is not within the scope of any American Defense Preparedness Association meeting or activity to discuss or be at all concerned with matters of trade, procurement, price, market or control or with placement of specific contracts or allocation of materials.

The Association cooperates to every practical extent with other recognized technical and industrial associations in assisting the Armed Services of the United States. Its mission is to keep America's armament strong in peace and in war. Its functions are as important and as worthy of support in times of international quiet, as well as in emergency. It is a peace society in purpose, in operations, and in fact.

AMERICAN DEFENSE PREPAREDNESS ASSOCIATION

TECHNICAL DOCUMENTATION DIVISION

STATEMENT OF AIMS AND PURPOSES

The Technical Documentation Division is part of the Defense Management Group of the American Defense Preparedness Association. The division was formed to provide the government and industry access to a group of experienced and responsible administrators and specialists from various sectors of industry, qualified to assist in the formulation of government and industry requirements for technical documentation. The members participate as individuals rather than representatives of their companies.

The division is concerned with all aspects of technical documentation: conception, analysis, preparation, management, control, and dissemination. The division's field of interest includes engineering drawings and standards, policies and procedures, technical publications, specifications, configuration controls, computer aided documentation techniques, and methods of data communication. Duplication of effort by other technical and industry associations is avoided.

Sections/Committees are established to study problems and submit resulting reports and recommendations. Section/Committee participation by an individual is voluntary and evidences his desire to comprehend government and industry needs, to reduce the complexity and cost of technical documentation, and to enhance standardization with a sincere interest to serve with other members to achieve these goals.

Division/Section members interface frequently with their counterparts in government and industry. This association serves as a clearinghouse for professional information interchange and provides a stimulation which contributes toward the success of the participant's work and enhances the individuals value to his employer.

In addition to section/committee reports on subjects completed or in process, the Technical Documentation Division convenes annually and conducts a program of timely subjects to keep the members and the public informed, alert, and interested in the problems and solutions associated with technical documentation vital to our national defense, industrial accomplishments, and other related programs.

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Anchor Software Management, Ltd

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Mr. Donald K. Swanson (presenter) and
Mr. Charles E. Gastineau (coauthor)
Defense Electronics Supply Center
Defense Logistic Agency

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Mr. Leland K. Womack
US Army Missile Command

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Mr. Frank W. James
Air Force Logistics Command

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USAF Systems Command and
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Naval Material Command

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Pitney Bowes

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Mr. Vincent Mayolo
Defense Materiel Specifications and Standards Office

SUMMARY OF WORKSHOPS

1 - Data Management .... P
Mr. John R. Hart, Chairman

2 - Engineering Drawings .... Q
Mr. Joseph R. Meitz, Chairman

3 - ILS/Technical Publications .... R
Mr. Richard E. Knob, Chairman

4 - Configuration Management .... S
Mr. Roger A. Storms, Chairman

5 - Specifications and Standards .... T
Mr. Walter A. Moran, Chairman

6 - Engineering Data Automation .... U
Mr. Gerald T. Durbin, Chairman

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TECHNICAL DOCUMENTATION DIVISION

SECTIONS AND COMMITTEES

Awards Committee	J.R. Meitz
Computer Software Section	J.D. Cooper
Configuration Management Section	C.J. Embrey
Contract Data Management Section	J.R. Hart
Defense Acquisition Regulations Section	C.D. Fisher
Engineering Data Automation Section	Dr. P.C.C. Wang
Engineering Drawing Requirements Section	J.R. Meitz
International Data Requirements Section	T.L. Golmis
Metrication Section	Lorna Burns
Micro-Reproduction Systems Section	J.R. Sutton
Preparation and Management of Specifications Section	S. Alvine, Jr
Technical Publications Section	R.E. Knob

Award Presentation May 21, 1980

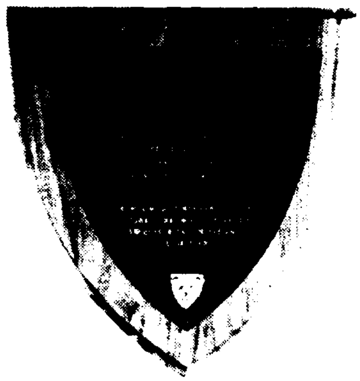
THE

R.H. STEARNS

AWARD

Presented to

Theodore L. Golmis



In every field of human activity there are those who lead and those who are led. Occasionally, among the leaders there are individuals who achieve superior stature. In the field of Engineering Documentation, Robert H. Stearns was one who, through dedication to principle and aggressive pursuance of duty, earned outstanding recognition in both industry and military circles.

Born in 1906 in New York City, Mr. Stearns' career included training both as a machinist and in engineering at White Motor Co., and as a drawing checker, chief checker, chief draftsman and engineering consultant during twenty-five years of service with the Douglas Aircraft Company.

He was also active personally and as the Douglas representatave on various industry association activities, special advisory committees to the Department of Defense and with the Engineering Data Management Section of the American Ordnance Association. He was taken from us by a most unfortunate aircraft accident en route home from a meeting of the Steering Committee of the Engineering Data Management Section in February 1962.

In recognition of his outstanding achievements, the *Robert H. Stearns Award* was established for the purpose of honoring Mr. Stearns and as a vehicle to recognize and honor those who might exhibit comparable qualities and achievement in the future. Specifically, candidates for the Award are judged on the basis of demonstration of outstanding qualities in the following attributes:

- Devotion to the field of documentation and meaningful achievement therein
- Vigorous and articulate in establishing and logically supporting a position
- Energetic with singleness of purpose
- Patriotic, honorable, pleasant, humble, sincere.

●

PAST RECIPIENTS OF THE AWARD

The Family of R.H. Stearns	1963
W.W. Thomas	1964
P.C. Weissbrod	1966
J.H. Mars	1968
D.S. Scott	1969
P.G. Belitsos	1969
C.A. Nazian	1970
J.L. Flippo	1970
R.F. Franciose	1971
G.D. Christensen	1972
C.A. Fricke	1973
J.R. Meitz	1974
D.R. Mitchell	1977
H.R. Lowers	1978
M.E. Taylor	1979

Mr. Theodore L. Golmis has been actively engaged in the field of engineering documentation for over twenty-eight years. He is a graduate of the U.S. Army School of Engineering at Fort Belvoir, Virginia, having also attended Rice University in Houston, Texas and Clark. Jr. College in Portland, Oregon.

Mr. Golmis began his industry career with Hoffman Electronic Laboratories Inc., where he established part numbering, titling, and data handling systems and was responsible for electrical and mechanical component standards. He joined Hughes Aircraft Company in 1956, where he assumed responsibility for identification, control, and accounting of engineering data from the proposal stage through final acquisition. He became Head of the Components and Standards Section and is now Manager of Configuration and Data Management Operations.

During his four year military career, he served as Communications Officer with the U.S. Army Corps of Engineers on duty with the Fifth Air Force in Korea.

The record shows a long and dedicated service to a lengthy list of industry and professional associations including the Los Angeles Chapter of the Standards Engineers Society of which he was President; Los Angeles Council of Engineers and Scientists of which he has held the offices of President and Treasurer; Institute of Electric and Electronic Engineers; Institute for Advancement of Engineering; Los Angeles Engineers Club; the Society of American Military Engineers; and the Hughes Management Club of which he is a past President. Mr. Golmis is also a Fellow of the Institute for Advancement of Engineering.

Mr. Golmis has traveled many miles and spent considerable energy in the cause of standardization. He has attended many meetings and given many presentations at the request of both industry and military disciplines.

He is well known and respected by all defense agencies for his knowledge and concern for both military and industry needs.

Mr. Golmis joined the Engineering Data Management section of the American Defense Preparedness Association in 1972. His abilities were immediately recognized and in 1974 he became Deputy Chairman of the section. In 1976, he became Chairman of this section, a position he still holds today. Under his leadership, the section became the Technical Documentation Division.

Mr. Golmis has worked very closely with other industry associations to eliminate overlap of efforts and obtain uniformity of a position which has aided both industry and military to resolve many delicate problems. He personally served on the DOD-D-1000 and MIL-STD-100 government/industry committee in the 1975 and 1978 revisions of these documents.

In support of the government, Mr. Golmis has undertaken the task of coordinating many joint government and industry seminars throughout the country on subjects of vital concern in the field of Technical Data.

Mr. Golmis was born in Ontario, Canada, and now lives in Hacienda Heights, California on an *island of isolation* now in the middle of the greater Los Angeles area. He has two daughters, including a married daughter, and a granddaughter.

In addition to maintaining his hillside orchards (staving off coyotes and rattlesnakes), Mr. Golmis enjoys traveling, skiing, building, restoring automobiles, camping, and boating.

No one more exemplifies the unique qualities and high standards to merit this award — dedication to the field of standardization, articulation, responsiveness, humility, and sincerity — than does Theodore L. Golmis.

American Defense Preparedness Association

TECHNICAL DOCUMENTATION DIVISION

TWENTY-SECOND ANNUAL MEETING

Program Chairman:

MR. BURTON G. SHAEFER
Pitney Bowes

Business Manager:

CAPT. NELSON P. JACKSON, USN (Ret)
ADPA Headquarters

SESSION 1

Chairman: MR. JOSEEPH V. SYMANOSKIE
E-Systems Incorporated
Melpar Division

Secretary: MR. DONALD C. DEROSIA
General Electric Company

AMERICAN DEFENSE PREPAREDNESS ASSOCIATION
TECHNICAL DOCUMENTATION DIVISION
1980 ANNUAL REPORT

BY

THEODORE L. GOLMIS

MANAGER, CONFIGURATION AND DATA MANAGEMENT OPERATIONS
HUGHES AIRCRAFT COMPANY

AND

CHAIRMAN, TECHNICAL DOCUMENTATION DIVISION

Good Morning, Ladies and Gentlemen. I would like to take this opportunity to express my personal appreciation and that of the American Defense Preparedness Association to all of the individuals that have made this meeting possible.

In particular, I would like to thank Capt. Warren Chase, Base Commander, for his kindness in hosting our Twenty-Second Annual Meeting of the Technical Documentation Division here at the Charleston Naval Station. We are indeed privileged to be able to share the facilities of this exciting, fully operational Naval Station, in a part of our country so rich with the history of our country's beginning.

It also gives me great pleasure to thank Mr. Burt Schaefer of Pitney Bowes, our Program Chairman and Capt. Nelson Jackson, ADPA Headquarters, who have worked for many months formulating, arranging, and managing this Twenty-Second Annual Meeting.

I would also like to thank my Executive Board who throughout the year take on the many tasks that allows this Division to function, to provide support to our Government activities, and to contribute to the resolution of technical documentation problems.

It has been our custom each year to open our meeting with an Annual Report. The Reports have generally summarized the accomplishments of the year. This year like so many of our previous years has been extremely rewarding. Through the dedicated efforts of our Section Chairman and members we have undertaken and completed a number of important tasks. Let me highlight just a few:

a) We reviewed and commented on the Department of Defense Parts Control System Instruction 4120.19. We found that the document was well done and generally satisfied requirements, but we did voice concern over the facts that: (1) the intent and limitations provided in the definitions of "Models" in MIL-STD-280 are sometimes not observed and (2) standardization personnel often are not aware of contractual requirements which results in preparation of drawings to support standardization which exceed contract drawing requirements.

b) We reviewed and commented on DoD Drawing Practices DRPR Standardization Document Program Plan. The overall purpose and objectives of the plan were endorsed; however we did stress the need to control service-peculiar documents and unique Data Items Descriptions and suggested that Industry be allowed to comment on service-peculiar documents before their issuance.

c) We were very fortunate in obtaining and reviewing a draft DoD Engineering Data Microreproduction System Standardization Program Plan under development of Headquarters Air Force Logistics Command.

d) The proposed American National Standard for Digital Representation of Physical Object Shapes, BSR Y14.26.1 was reviewed. The Technical Documentation Division submitted a negative vote on the proposed national standard. ANSI recognized the need for testing and clarifying of certain technical and theoretical questions. A goal was set to revise the draft by mid-1980.

e) Our Metrication Section reviewed the proposed American National Standard for Metric Practice BSR/IEEE STD 268-1978. It was the consensus of the Metrication Section that the proposed standard is basically an acceptable document, but there was major concern voiced over the current existence of two national standards on the same subject.

f) Dr. Peter Wang, our Chairman of the Engineering Data Automation Section, chaired the Second Symposium on Automation Technology in Engineering Drawings at the Naval Postgraduate School, 13-15 Novermber 1979. The symposium was very successful and is planned as an annual event.

g) Mr. Joseph Meitz, Chairman of the Engineering Drawing Requirements Section, has been very involved since our last Annual Meeting. His section has undertaken an in-depth study of the Specification and Source Control Drawing. It's been a highly coordinated effort with outstanding results. You will learn much more about this subject from Mr. Meitz.

h) A proposed revision to DoD Directive 4120.21, "Application of Specification and Standards and Related Documents in the Acquisition Process", was circulated within Industry. The consensus of the Technical Documentation Division was that it reflected an excellent example of a cooperative Government/Industry effort which resulted in a document that can provide significant savings to the military acquisition system.

I am also proud to announce that the Defense Material Specifications and Standards Office has requested the Technical Documentation Division to sponsor the second seminar on Tailoring of Specifications and Standards to highlight the current revision of the document and the developments of the last two years. Naturally, we accepted.

It's also very important to note that since our last Annual Meeting we have established new affiliations to strengthen our ability to better satisfy our Government/Industry ADPA mission.

These include:

1) The assignment of Mrs. Lorna Burns, our Metrication Section Chairman, as the ADPA coordinator to the United States Metric Board.

2) Mr. Robert Freedman, Configuration Management Division, Defense Intelligence Agency, joined us at the January Executive Board Meeting in Washington, D. C. We hope Mr. Freedman will participate on a permanent basis.

3) The Technical Documentation Division received an invitation from the National Micrographics Association to become a member of the PH5 Committee, Micrographics Reproduction, and the C7 Committee Microfilming of Engineering Drawings. Mr. William E. Neale, NMA Technical Coordination, attended our last Executive Board meeting in Washington, DC.

4) An investigation of ADPA membership in the American National Metric Council has been initiated.

5) Mr. Richard Miller of the Defense Logistics Agency has been appointed to the Executive Board re-establishing our DLA representation.

6) We made new friends at the Naval Ordnance Station in Louisville, Kentucky thanks to Mr. Derrick McMahon. The Louisville Station is one of the largest Navy data repositories.

7) And we received an introduction to the Office of Federal Procurement Policy (OFPP) and their new practice regarding the acquisition and distribution of commercial, off-the-shelf items through use of specifications, standards, and a new document called Commercial Item Descriptions (CID).

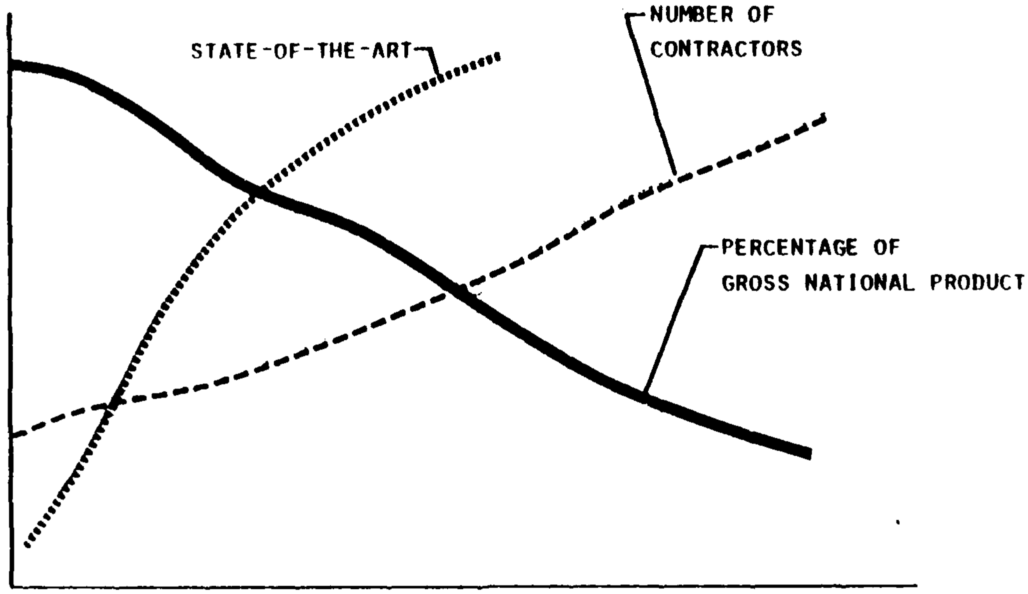


Figure 1. Trends Over the Past Fifteeen Years

That highlights just a few of our TDD accomplishments since this time last year; however, what I really wish to address is not history but our future. What will take place in this new decade of the "80s"? What problems will Government and Industry face in the next ten years and how can we cope with these problems?

Our principle interest lies with those aspects of the acquisition policy that deals with technical documentation--drawings, specifications, standards, manuals, configuration management, etc. They are vital elements of the acquisition business and are, as we all know, extremely costly. It has been estimated that technical documentation alone costs the Department of Defense from 3 to 5 billion dollars annually and that we spend another 3 to 5 billion per year on the "gold plate" in our hardware.

So, if through meetings like this, we improve our methods of operation, even a small percentage in our area of interest, it may mean millions of dollars savings to the taxpayer.

The problems we will face in the "80s" will stem from several major problems we have been experiencing:

a) Inflation and the shrinking Military dollar.

b) Diminishing Defense Contract interest.

c) Increasing competition both in the U.S. and abroad.

d) Lack of standardization and excessive requirements.

e) Automation.

These problems are further compounded by the ever-increasing loss of knowledgeable senior personnel.

Over the past fifteen years, the U. S. Defense spending, as a percentage of our Gross National Product, has fallen from nine percent to just over five percent (Figure 1). Two things can be realized from this: while the number of contractors in this Country has been going up, the Defense dollar was going down. Result: keen competition for fewer dollars. The other aspect of the problem is that this time period also brought about a tremendous acceleration in the state-of-the-art. So much so, that many in industry exploited the technological and industrial strength resulting from defense research, left the military arena and found a hungry and waiting market in the commercial field, yielding substantial profit without excessive regulation.

One fundamental obstacle we have faced in enhancing our Military technological and industrial position is the maze of regulations and requirements we have imposed upon ourselves and our suppliers. The net effect of these restrictions has often been diametrically opposite to their initial objectives. Rather than enhancing the

Government's procurement position and reducing costs, our over-regulation has led to excessive weapon systems costs and unreasonablele delays in the acquisition cycle.

Today, private industry performs about seventy percent of all research and development in the United States and makes up the largest segment of our Defense/Industrial base. As private industry's and society's demand for more modern and sophisticated equipment grows, Federal influence on research and development is bound to be diminished. With growing markets, an increasing number of American companies are refusing to do business with DoD. Many of these companies have identified DoD policies and practices, including excessive regulation and red-tape, as a cause of their ceasing to compete for Defense business. We simply cannot afford to lose the strength of our industrial base because of bureaucracy and archaic practices. To compete in the commercial marketplace, DoD must look more like a commercial buyer.

I am not suggesting we "go commercial". I want only to suggest that we simply recognize the current environment and join the attempt to improve our capability.

A large fraction of the cost associated with a specification (be it for soldering, standard parts, or configuration management) arises from any change to normal procedures required to comply with the specified approach, or from superimposing a preconceived, mandatory system on an existing structure.

Industry in general, has been very vocal about these impositions, but are in fact a part of the problem. They fail their customer by being totally "responsive" and not offering alternatives. Industry very often reads more into the requirements than was every intended. They fear that discussions of cost driving details or a request for an exception will jeopardize their competive position. The contractor is most often in the best position to reduce costs.

Defense contractors have worked for years to establish their design standards, processes, and program control systems to conform to Military specifications. If this could be better recognized and accepted by procuring activities, existing contractor systems could eliminate the incremental cost of compliance.

The best possible suggestion I can make and the one I recommend the strongest is that of determining what the contractor's capabilities are, during the RFP--right up front. Negotiate at a specialist-level, and adjust requirements to as many of the contractor's existing systems as possible.

Most prime contractors today are doing business with more than one of the services--the Army, Navy, Air Force, Marine Corp, and special agencies such as NSA. As a result, they have over the years fully militarized their managment systems to accommodate the Defense business. Recently, however, it's becoming harder to

fulfill standard requirements since each of the services tend to create their own service-peculiar directives, specifications, and procedures.

Really I should make two suggestions: (1) use the contractors' existing systems which satisfy the objectives of the program and (2) foster DoD common directives, specifications, and standards. This will also cut down on the "Should Cost Teams". Some of the proposal review teams, out of necessity, are larger than the contractor's proposal team.

The service-peculiar documents are major cost drivers. I strongly encourage your full participation and influence on a Standardization Program--many millions of dollars can be saved.

Automation technology, which includes computer graphics and interactive graphics is certainly an important technology which holds immediate potential for productivity improvements. Demonstrated over a period of approximately 10 years, computer graphics systems have become the object of considerable attention, progressive product development, and decreased hardware costs. Increased user awareness of potential benefits have resulted in a sharp increase in the number of industrial and non-industrial applications. Automation technology and its associated graphics systems are playing a major role in the development of integrated systems for computer-aided design and manufacture.

It is predicted that computer graphics sales will reach $1.5 billion by 1986. There are currently more than 100 vendors manufacturing graphics equipment to fill the need. As equipment and software become more effective and available, and more users are found, the cost effectiveness of using computer graphics will bring it to almost every industry. Aerospace, electronics, and most other military contractors have been there for years, but not our specifications and standards.

The field of automated documentation must be recognized and dealt with immediately. Industry cannot keep pace with their competition without automated systems. There is a reluctance on the part of some agencies to accept the output of these systems. Some agencies state that data prepared by utilization of a Automatic Data Processing System are not acceptable. Machine prepared data can be produced at a fraction of the cost of hand-prepared data and with greater accuracy. We are often submitting microfilm or prints of lists when magnetic tapes could be delivered, providing the customer greater versatility at lower costs. Government and Industry must get must get together on this issue.

Another key problem to be solved is Data Base Configuration Management. What do you do when there is no paper to manage? We can no longer say, "we'll look into it later." It's standard practice today and many elements of the Goverment and Industry are not recognizing the problem. Instead they are imposing second systems on top of existing systems and are paying for it.

That covers the five major problems. But what other problems are in store for the 80's? How about:

- Control of Deliverable Software?
- Identification and Management of Firmware?
- Increased use of Proprietary Items?
- Implementation of Tailoring?
- Management of Automated Testing?
- The Paperless Office?
- Digitizing Engineering Drawings?
- Technology Transfer?
- NATO Interchangeability?
- Metric Implementation?
- Expanding Service Unique Requirements?
- Duplicate Items in the Inventory?

So what does all this really mean? How can we cope with the "80s" and improve the climate of specification application? Improving the climate of application, requires the use of common sense in the adaptation, interpretation, and application of specifications.

We should have reliance upon the judgement of competent people rather than have reliance on requirements which have been prematurely specified.

We should re-evaluate our requirements from RFP through contract closure. Ths modern environment we live in must be characterized by faith in competent people if we intend to reduce cost and increase the quality of defense systems. We must create a climate in which creativity and innovations are not encumbered by inappropriate procedures, unnecessary paperwork, and premature or unduly detailed requirements. Most of all, we must communicate.

The majority of prime contractors in this Defense business are totally dedicated to the military way of business--they know it better than any other way of business and have structured their entire companies to facilitate the military business methods. These contractors, as well as organizations such as AIA, EIA, NSIA and, particularly, ADPA, all support the Military/Industry Team, struggling to improve the system. A union of these people will assure a productive decade.

I want to express my sincere appreciation for this opportunity. If any of the problems I have introduced can be solved or at least partially eliminated, we have all contributed to better Government/Industry working relationships.

FEDERAL METRICATION POLICY AND INITIATIVES

Mr. Howard B. Ellsworth

Department of Defense

SUBJECT: FEDERAL METRICATION POLICY AND INITIATIVES

DATE: MAY 1980

BY: HOWARD B. ELLSWORTH, DEPARTMENT OF DEFENSE

GOOD MORNING THANK YOU FOR ASKING US TO SPEAK ON THE GOVERNMENT'S ROLE.

IT HAS BEEN SAID THAT EVERY HUMAN BEING SHOULD GIVE TWO YEARS OF HIS LIFE TO CONQUER PLAGUES, DRAIN MARSHES, IRRIGATE THE DESERTS, DIG CANALS AND BUILD SOCIETY.* U.S. GOVERNMENT METRIC CONVERSION ACTIVITIES HAVE NOT BEEN SO FORTUNATE. OUR SERVITUDE MAY LAST 10 TO 20 YEARS, EXTENDING FEDERAL ACTIVITIES AND COST. HOPEFULLY UNLIKE SOME FEDERAL PROGRAMS THAT SEEM TO GO ON AND ON, THIS ONE WILL FINALLY COME TO AN END.

PASSAGE OF THE U.S. METRIC CONVERSION ACT OF 1975 (PL 94-168), IS SEEN BY FEDERAL AGENCIES AS AN EXPRESSION TO INCREASE THE USE OF METRIC MEASUREMENTS BEYOND THAT PASSED BY CONGRESS WHEN IT AUTHORIZED THE USE OF THE METRIC SYSTEM OF MEASUREMENTS IN 1866 (WEIGHTS AND MEASURES ACT - 14 STAT 339). THE SECRETARY OF COMMERCE ANTICIPATED THE PASSAGE OF THE U.S. 1975 LAW BY REQUESTING FEDERAL AGENCIES TO SUPPORT THE ESTABLISHMENT OF A METRIC INTERAGENCY COMMITTEE. IN ADDITION, DAVID RUBENSTEIN DEPUTY ASSISTANT FOR WHITE HOUSE DOMESTIC AFFAIRS, STATED AT THE APRIL 1978 ANNUAL AMERICAN NATIONAL METRIC COUNCIL (ANMC) CONFERENC THAT THE ADMINISTRATION BELIEVES THERE ARE SIGNIFICANT BENEFITS TO BE GAINED FRO METRIC CONVERSION AND, THEREFORE, IT SUPPORTS A STRONG INTERPRETATION OF THE METRIC CONVERSION ACT. THIS STRONG ENDORSEMENT WAS AGAIN REPEATED IN A JANUARY 1980 LETTER SIGNED BY THE PRESIDENT. IT IS COMMON BELIEF THAT THE HODGEPODGE OF A DOUBLE STANDARD (JOINT METRIC AND INCH/POUND USE) WOULD BE

* EXPRESSED BY WILLIAM JAMES, AUTHOR, PHYSICIAN AND PHILOSOPHER.

COSTLY, CONFUSING and INCREASE THE DIFFICULTY IN THE FEDERAL GOVERNMENT's RESPONSIBILITIES TO THE PUBLIC.

AS NOTED EARLIER, WITH THE CREATION OF THE U.S. METRIC BOARD, AS PROVIDED IN THE U.S. METRIC ACT, THE FEDERAL SECTOR PUT TOGETHER A TOP-LEVEL MANAGEMENT STRUCTURE IN ORDER TO EFFECTIVELY PREPARE FOR AND MANAGE THE INCREASING USE OF METRIC DIMENSIONS, BOTH WITHIN ITSELF AND IN COORDINATION WITH ELEMENTS OF THE PRIVATE SECTOR IT AFFECTS. IN ORDER TO COORDINATE AND PLAN THE INCREASING USE OF THE METRIC SYSTEM IN THE U.S. ON A VOLUNTARY BASIS, IT IS ESSENTIAL THAT PLANS IN SUPPORT THEREOF BE DEVELOPED AND MADE READY WHEN SUBSEQUENT VOLUNTARY CONVERSION ACTIONS MAKE SENSE. THIS MEANS THAT PLANNING MAY NOT NECESSARILY BE VOLUNTARY, THOUGH THE APPLICATION OF SUCH PLANS SHOULD GENERALLY AWAIT CONSENSUS BY THOSE RESPONSIBLE FOR THEIR IMPLEMENTATION AND THOSE AFFECTED BY IT. THE METRIC CONVERSION ACT (PL 94-168) IS NOT COMPULSORY LEGISLATION. VOLUNTARY CONVERSION IS STRESSED IN ITS PROVISIONS. HOWEVER, SUCH VOLUNTEERISM IN NO WAY IMPLIES A LAISSEZ FAIRE RELIANCE ON UNSTRUCTURED PRIVATE INITIATIVE. THE ACT IMPLIES THE ACTIVE SEEKING OF A CONSENSUS TO IMPLEMENT DESIRABLE NATIONAL METRIC CONVERSION GOALS FOR THE AFFECTED SECTORS OF U.S. SOCIETY.

TO THIS END, THE INTERAGENCY COMMITTEE ON METRIC POLICY (ICMP) HAS BEEN ESTABLISHED. IT CONSISTS OF TOP-LEVEL FEDERAL EXECUTIVES. ITS PURPOSE IS TO COORDINATE AND PROVIDE POLICY GUIDANCE REGARDING U.S. GOVERNMENT EFFORTS TO IMPLEMENT METRIC CONVERSION UNDER THE AUSPICES OF THE UNITED STATES METRIC BOARD. THE OBJECTIVE IS TO PROMOTE EFFECTIVE AND CONSISTENT POLICIES IN METRIC CONVERSION THROUGHOUT THE FEDERAL SECTOR. A COPY OF ITS CHARTER IS ATTACHED. ABOUT 34 FEDERAL AGENCIES ARE MEMBERS.

A SUBORDINATE METRICATION OPERATING COMMITTEE (MOC) HAS ALSO BEEN ESTABLISHED TO UNDERTAKE TASKS ASSIGNED TO IT BY THE ICMP. ITS ACTIVITIES BRIEFLY INCLUDE:

- TRACKING FEDERAL METRIC ACTIVITIES.
- RECOMMENDING TO THE ICMP PLANS AND PROGRAMS ON THE DEVELOPMENT OF CONSISTENT GOVERNMENT METRIC POLICIES, AND RELATED ACTIVITIES.

THE DETAILS OF THE MOC'S RESPONSIBILITIES ARE CONTAINED IN ITS CHARTER, A COPY OF WHICH IS ATTACHED.

ENCLOSURES THREE AND FOUR SHOW IN BLOCK DIAGRAM FORM THE INTERRELATIONSHIPS BETWEEN THE ICMP, MOC AND AN EARLIER ESTABLISHED INTERAGENCY COMMITTEE ON STANDARDS POLICY (ICSP). THE PURPOSE OF THE ICSP AND THE NEWLY FORMED METRIC STANDARDS SUBCOMMITTEE DON'T NEED FURTHER EXPLANATION. YOU WILL NOTE THAT THE MOC HAS A NUMBER OF SUBCOMMITTEES. THESE COMMITTEES, FORMERLY CALLED DIVISIONS, ARE TO MONITOR AND PARTICIPATE IN METRIC PLANNING AND RELATED ACTIVITIES IN THEIR TITLE AREAS. THEY RECOMMEND TO THE MOC CHAIRPERSON AND TO OTHER COMMITTEES, AS APPROPRIATE, ACTIONS THAT SHOULD BE TAKEN. THEY ALSO SERVE AS POINTS OF CONTACT AND LIAISON WITH INDUSTRY, THE PUBLIC AND PRIVATE ORGANIZATIONS. ENCLOSURE FIVE IS A COPY OF THEIR ORGANIZATION, PURPOSE AND OPERATION.

AN EXAMPLE OF ICMP/MOC WORK IS THE RECENT FEDERAL AGENCIES METRIC POLICY AND GUIDELINES PUBLISHED IN THE FEDERAL REGISTER ON 8 JANUARY 1980 FOR COMMENT. A COPY IS PROVIDED AS ENCLOSURE SIX. BASICALLY, THESE TWO DOCUMENTS WERE DEVELOPED TO GUIDE GOVERNMENT IN DEVELOPING POLICIES AND ACTION NEEDED TO SUPPORT VOLUNTARY CONVERSION. AGAIN, I WOULD LIKE TO EMPHASIZE THAT PLANNING IN SUPPORT OF VOLUNTARY CONVERSION MAY HAVE TO BE MANDATORY, INCLUDING THE ASSOCIATED TIME FRAME FOR THEIR INITIATION AND COMPLETION. ONCE COMPLETED, SUCH PLANS CAN AND OFTEN DO GO ON THE SHELF TO AWAIT A DECISION FOR USE IN METRIC CONVERSION INITIATIVES.

BECAUSE OF ITS RESPONSIBILITY TO ASSIST EACH SECTOR OF THE ECONOMY TO ACHIEVE THE ABILITY TO OPERATE EFFICIENTLY AND ECONOMICALLY USING METRIC MEASUREMENTS, THE AMERICAN NATIONAL METRIC COUNCIL (ANMC) IS VITALLY IMPORTANT TO THE FEDERAL GOVERNMENT. WE WORK WITH THEIR SECTORS AND DO OUR LEVEL BEST TO INSURE METRIC PLANS AND SUBSEQUENT CONVERSION INITIATIVES ARE COORDINATED. THIS ALSO ASSISTS THE U.S. METRIC BOARD TO FULFILL THAT PART OF ITS RESPONSIBILITIES UNDER THE ACT TO "DEVISE AND CARRY OUT A BROAD PROGRAM OF PLANNING, COORDINATION, AND PUBLIC EDUCATION CONSISTENT WITH NATIONAL POLICY INTERESTS." (SECTION 6, P.L. 94-168)

I HAVE BEEN ASKED TO PROVIDE SOME SPECIFIC AND SIGNIFICANT EXAMPLES OF ONGOING METRIC ACTIVITIES IN THE FEDERAL SECTOR. THESE ARE:

<u>TRANSPORTATION</u>

DEPARTMENT OF TRANSPORTATION HAS ESTABLISHED A METRIC COORDINATOR LOCATED IN THE OFFICE OF THEIR ASSISTANT SECRETARY FOR POLICY AND INTERNATIONAL AFFAIRS. A METRIC COORDINATING COMMITTEE

HAS ALSO BEEN FORMED, COMPOSED OF METRIC COORDINATORS OF EACH OF THE DEPARTMENT'S AGENCIES. MR. BRYON NUPP, DOT'S MEMBER OF OUR MOC EXECUTIVE BOARD, HAS TOLD ME THAT ALL OF DOT's AGENCIES HAVE DRAFTED METRIC ORDERS GOVERNING THEIR ACTIVITIES BUT NOT ALL OF THESE HAVE YET BEEN APPROVED BY THE RESPECTIVE AGENCY HEADS.

EXAMPLES OF SOME OF DOT'S METRICATION INITIATIVES CONSIST OF CONVERTING THE ENTIRE ST. LAWRENCE SEAWAY OPERATION. THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION (NHTSA) HAS PROVIDED FOR USE OF METRIC UNITS IN SOME OF ITS SAFETY SPECIFICATIONS. HOWEVER, ON THE NEGATIVE SIDE, THE FEDERAL HIGHWAY ADMINISTRATION ENCOUNTERED STRONG ADVERSE PUBLIC REACTIONS TO A PLAN FOR THE CONVERSION OF THE U.S. HIGHWAY ROAD SIGNS.

BECAUSE TRANSPORTATION IS CAUGHT IN THE MIDDLE OF THE BALANCE OF FORCES IN U.S. SOCIETY AND BECAUSE IT IS INVOLVED IN ALL ECONOMIC AND SOCIAL ACTIVITIES, IT MUST, OF NECESSITY, MOVE AT THE SAME PACE AS SOCIETY IN GENERAL.

AGRICULTURE

ON JULY 1, 1978, THE DEPARTMENT OF AGRICULTURE BEGAN A PUBLIC AWARENESS POLICY ON THE USE OF DUAL UNITS IN THE TEXT OF THEIR POPULAR, NON-TECHNICAL PUBLICATIONS. AS YOU MAY ALREADY BE AWARE, AGRICULTURE HAS SO MANY INFORMATION AND ACTION CONTRACTS WITH THE PUBLIC THAT IT HAS OFTEN BEEN CALLED THE PEOPLE'S DEPARTMENT. THIS ASPECT IS FULLY RECOGNIZED IN THE APPROVED METRIC POLICY FOR ALL FEDERAL AGENCIES THAT IS BEING PROVIDED TO YOU. AT A PUBLIC HEARING ON MAY 15, 1979, USDA URGED AGRICULTURAL ASSOCIATIONS TO PARTICIPATE WITH GOVERNMENT IN THE U.S. METRIC CONVERSION PROCESS. THE DEPARTMENT STATED THAT INTERNAL CONVERSION IS WELL UNDERWAY AND THAT IT WOULD BE WORKING WITH THE PRIVATE ENTITIES FOR CONSENSUS

METRICATION ACROSS AGRICULTURAL SECTORS. USDA HAS AN INTERNAL REGULATION COVERING ITS METRICATION POLICIES, INCLUDING THE SPECIFIC RESPONSIBILITIES OF ITS INVOLVED ACTIVITIES. ONE OF THE MORE PROGRESSIVE SECTORS IN THE AGRICULTURAL FIELD IS THE FRESH FRUIT AND VEGETABLE INDUSTRY, WHICH IS IN THE PROCESS OF INCORPORATING METRICATION IN ITS GENERAL REORGANIZATION OF PACKAGING, LABELING, AND SHIPPING. THE PRIMARY PRESSURE ON THE INDUSTRY STEMS FROM FOREIGN TRADE REQUIREMENTS AND THE RISING COST AND COORDINATION PROBLEMS IN TRANSPORTATION OF PERISHABLE COMMODITIES.

HEALTH, EDUCATION AND WELFARE

HEW IS ALSO WELL ON ITS WAY TO INSURING THAT METRIC MEASUREMENTS ARE PROPERLY CONSIDERED IN THE U.S. TRANSITION. AMONG OTHER PRODUCTS, A METRIC GUIDE FOR EDUCATIONAL MATERIALS HAS BEEN PUBLISHED. IT IS A HANDBOOK FOR TEACHERS, WRITERS AND PUBLISHERS AND OTHERS WHO PREPARE ELEMENTARY AND SECONDARY EDUCATIONAL MATERIALS. IN ADDITION, HEW HAS ESTABLISHED A DEPARTMENT-WIDE METRIC EDUCATION PLANNING PROCESS. THERE WILL BE AN OVERALL DEPARTMENTAL EVALUATION REVIEW THAT IS TO BE COMPLETED BY JUNE 30 OF EACH YEAR IN ORDER TO MONITOR AND EFFECTIVELY DOCUMENT PROGRESS AND LESSONS LEARNED. OF COURSE, THIS ACTIVITY WILL BE TRANSFERRED TO THE NEW DEPARTMENT OF EDUCATION RECENTLY ESTABLISHED BY CONGRESS. THE REMAINING PART OF THE OLD HEW, TO BE CALLED THE DEPARTMENT OF HEALTH AND HUMAN SERVICES, IS IN THE PROCESS OF ESTABLISHING STANDARDS AND SPECIFICATIONS IN THE SAME KIND OF PLANNING PROCESS.

DEFENSE

THE DEPARTMENT OF DEFENSE HAS PUBLISHED A METRICATION POLICY DIRECTIVE AND A SUPPORTING DETAILED METRICATION PLAN IS CURRENTLY IN PREPARATION AND CONSISTS OF SPECIFIC TASKS THAT NEED TO BE UNDERTAKEN IN ORDER TO EFFECTIVELY TRANSITION THE DEPARTMENT TO THE USE OF THE METRIC SYSTEM OF MEASUREMENTS. BRIEFLY, DEFENSE WILL ADOPT THE METRIC SYSTEM WHEN:

- THERE IS A SPECIFIC MILITARY NEED FOR MATERIAL TO BE USED JOINTLY WITH NATO AND OTHER ALLIED NATIONS.

- MILITARY MATERIAL HAS A POTENTIAL FOR SIGNIFICANT FOREIGN SALES OR JOINT PRODUCTION PROGRAMS.

- INDUSTRY HAS MADE SIGNIFICANT PROGRESS IN METRIC CONVERSION AND PRODUCTION FACILITIES ARE AVAILABLE.

- DEFENSE AND INDUSTRY MILITARY PREPAREDNESS OR DEFENSE PRODUCTION READINESS MAY BE ENHANCED.

- OTHER AREAS THAT OFFER AN ECONOMICAL, OPERATIONAL OR OTHER ADVANTAGES OR WHEN NO DISADVANTAGE IS INCURRED.

ENCLOSURE 7 IS A BREAK-OUT OF SOME OF OUR DEFENSE WEAPONS THAT USE METRIC DIMENSIONS. THE MX MISSILE SYSTEMS IS SHOWN TO BE 50% METRIC. HOWEVER, A

RECENT AIR FORCE REEVALUATION OF THE ADVANTAGES AND DIS-ADVANTAGES, BASED ON LATER DESIGN INFORMATION, HAS RESULTED IN THEIR CANCELLING THE USE OF METRIC DIMENSIONS IN THE MX. A POSITION PAPER EXPLAINING THIS CHANGE IS CURRENTLY IN PREPARATION

MORE RECENTLY, DR. WILLIAM PERRY, UNDERSECRETARY FOR RESEARCH AND ENGINEERING ESTABLISHED A TARGET DATE OF 1990 FOR AVAILABILITY OF A COMPLETE SPECTRUM OF METRIC SPECIFICATIONS AND STANDARDS THAT CAN BE USED TO IMPLEMENT DESIRABLE DEFENSE METRICATION GOALS.

IN CONCLUSION, THE U.S. METRIC ACT REQUIRES THE U.S. METRIC BOARD TO SUBMIT TO THE CONGRESS AND THE PRESIDENT AN ANNUAL REPORT ON ITS ACTIVITIES, INCLUDING RECOMMENDATIONS. THIS YEAR'S REPORT INCLUDES FEDERAL ACTIVITIES FOR THE FIRST TIME.

October 18, 1978

UNITED STATES METRIC BOARD

Charter of

The Interagency Committee on Metric Policy

Establishment

1. The Interagency Committee on Metric Policy (hereinafter the "Committee") is hereby established to advise the U.S. Metric Board and the Heads of Federal departments and agencies.

2. The Committee will be responsible to and report to the U.S. Metric Board.

Purpose and Scope

The purpose of the Committee is to coordinate and provide policy guidance regarding U.S. Government efforts to implement metric conversion, under the auspices of the United States Metric Board (established pursuant to the Metric Conversion Act of 1975). The objective of the Committee shall be to promote effective and consistent policies in metric conversion activities throughout the public and private sectors. The scope of the Committee's activities shall include, but not be limited to: standards; training, education and public information; weights and measures; consumer affairs; procurement; data collection; and Federal administrative procedures, as these relate to U.S. Government metric conversion activities.

Functions

The Committee, with respect to the internal operations

of the Federal Government and in order to facilitate U.S. Government and public conversion to metric, shall:

1. Collect and analyze data as appropriate;
2. Provide Executive Branch coordination with other activities of United States Metric Board, established by Section 5 of the Metric Conversion Act of 1975 (P.L. 94-168);
3. Prepare, as appropriate, recommended metric conversion plans and policies for the Federal Government in those areas where more than one Federal department or agency has a primary interest, such as transportation, consumer affairs, construction, procurement, weights and measures, and data collection;
4. Prepare, as appropriate, recommendations concerning the development of uniform Federal Government metrication policies, plans, and actions for interaction by Federal departments and agencies with private sector, State, and local government interests engaged in metric activities;
5. Seek to identify needs and actions to strengthen coordination among Federal departments and agencies in their metric conversion activities;
6. With the agreement of the departments and agencies concerned, endeavor to resolve differences among Federal departments and agencies serving on the Committee

regarding their implementation of metrication, when in the opinion of the Committee such differences are likely to inhibit efficient Federal Government or private sector conversion to metric or create conditions among people requiring Federal attention and assistance;

7. Take steps to eliminate unnecessary duplication of Federal metric activities with those which may be performed outside the Federal Government; and

8. Seek optimum harmony between the United States and other countries during the process of metric conversion.

Membership

1. The initial voting members of the Committee shall be:

   A. Federal Departments

      (To be added.)

   B. (Federal Agencies

      (To be added.)

2. The initial non-voting observer members of the Committee shall be:

      (To be added.)

3. Other Federal departments or agencies may become voting members or non-voting observer members of the Committee upon application to or by invitation from the Chairman, United States Metric Board.

4. In order to maximize the effectiveness of the Committee, it is necessary that voting representatives be responsible policy-making individuals at a relatively senior level. Accordingly, the Head of each Federal department serving on the Committee shall appoint a responsible official whose rank shall not be less than a "Level IV" of the Executive Schedule (5 U.S.C. 5312-15, 5317) to serve as the Federal department's metric policy official and representative on the Committee. At the discretion of the chair, the chair may approve a member chosen at a level other than that specified provided that the level is consistent with the overall intent of the Charter that each member be at the policy-making level. The Head of a Federal agency (i.e. ... not a full department) serving on the Committee shall appoint a representative whose rank shall be consistent with effective implementation of the objectives and functions of the Committee. The Head of each Federal department and agency serving on the Committee shall inform the Chairman of his or her appointed voting representative. Appointments to the Committee shall be for an indefinite term.

5. A Federal department or agency not wishing to participate as a voting member of the Committee may participate as a "non-voting observer." The Head of such department or

agency shall inform the Chairman of his or her appointed observer-representative. Observer appointments shall be for an indefinite term. There are no minimum grade level requirements for observers.

Administrative Provisions

1. The Chairman of the U.S. Metric Board will be Chairman of the Committee. In the event of his unavailability, he shall designate another member of the United States Metric Board to serve as Chairman.
2. Meetings of the Committee shall be conducted only when a quorum is present at the commencement thereof. One-third of the voting membership of the Committee shall constitute a quorum. The Committee shall meet not less than twice per each 12-month period.
3. Amendments to the Charter may be made upon approval of two-thirds of the Committee's voting membership at the time.
4. The Committee may establish an Executive Committee, subcommittees, and working groups as deemed appropriate. A Committee representative may bring experts from his Federal department or agency to Committee meetings to participate in discussions of particular items on the agenda. Upon receiving prior approval of the Chairman, Committee representatives may invite individuals who

are not employees of their Federal departments or agencies, including nongovernment consultants or observers, to participate in such discussions on an ad hoc basis.

5. The Committee may draft other administrative or operating procedures as necessary, consistent with its purpose and functions.

6. As may be necessary for carrying out the functions of this Committee, member departments and agencies shall cooperate fully in endeavoring to furnish appropriate assistance to the Committee.

Annual Report

The Committee shall submit a progress report to the U.S. Metric Board at 12-month intervals after its establishment. This report should summarize the Committee's activities during the previous 12-month period and include a description of all recommendations formulated by the Committee and actions taken in response to such recommendations during the period covered.

Duration

The Committee shall terminate when the Board determines that continuation of the Committee is not necessary.

Signed ______________________
Chairman,
United States Metric Board

Date ________________

AUGUST 14, 1979

INTERAGENCY COMMITTEE ON METRIC POLICY
METRICATION OPERATING COMMITTEE
ESTABLISHMENT, ORGANIZATION, AND OPERATION
OF SUBCOMMITTEES

DRAFT

1. INTRODUCTION

This document describes the establishment, organization, and operations of the subcommittees of the Metrication Operating Committee (MOC) of the Interagency Committee on Metric Policy (ICMP). Subcommittees are defined as areas of related interests (such as transportation, construction, education, printing, and mapping) whose activities have an economic, regulatory, operational, education, or sociological impact, and which involve the responsibilities, operations, and interests of the Federal agencies. The objective of this document is to provide mechanisms and procedures which are guides to the operations of the subcommittees.

2. ESTABLISHMENT OF SUBCOMMITTEES

Proposals for the establishment of a subcommittee should be submitted to the MOC Chairperson who will (a) provide copies of the request to the MOC and (b) enter it as an action item on the agenda of the next sequential meeting. Recommendation for the establishment of the subcommittees should contain the following information:

1. Title

2. Proposed lead agency -

   Identify the Federal department or agency which should have primary responsibility for the proposed subcommittee.

3. Other agencies -

   Identify any Federal department or agency having a major interest or responsibility in the proposed subcommittee.

4. Purpose and objective -

   Define the purpose and objective of the proposed subcommittee. Wording should be very brief to give ideas and need not be complete sentences.

5. Interface -

   Identify any non-Federal agency or organization that will have a major interest or responsibility in the proposed subcommittee.

DRAFT

6. Function -

Define the function to be performed by the proposed subcommittee. The functions should be related to the purpose and objective identified in section 4. Wording should be very brief and complete sentences are not needed.

7. Justification -

Provide a brief statement of justification as to the need for the proposed subcommittee. This paragraph should relate to the purpose and objective of the proposed subcommittee and the Federal departments and agencies identified in sections 2 and 3. "Motherhood" statements on metrication should be excluded.

The approval for establishment of a subcommittee will be by vote of the MOC. Upon approval, the MOC Chairperson will undertake the actions necessary to establish the subcommittee. Membership of the subcommittees shall be provided by the concerned agencies through the agency metric coordinators.

3. SUBCOMMITTEE ORGANIZATION:

The subcommittee will consist of a Chairperson, appointed by the MOC Chairperson, and members from the concerned Federal agencies. The membership should consist of such scientific, technical, professional, managerial, and other specialists needed to accomplish the mission of the subcommittee. The subcommittee may establish such sectors or working groups necessary to meet the subcommittee's objectives.

4. SUBCOMMITTEE RESPONSIBILITIES

Each subcommittee shall:

A. Develop a concise and pithy subcommittee plan for its activities and provide it to the Chairperson of the MOC for information. The plan should include the objectives to be accomplished, the critical events, and the proposed schedule. The plan should be updated annually.

B. Provide (1) periodic status or progress reports and recommendations, and (2) an annual report to the MOC Chairperson.

C. Keep abreast of the status of metrication at the national and international levels as it relates to the subcommittee and to the activities of the Federal agencies.

D. Ascertain and advise the responsible regulatory agencies of statutory or regulatory changes that have to be made in order to permit, facilitate, or expedite metrication in the subcommittee.

DRAFT

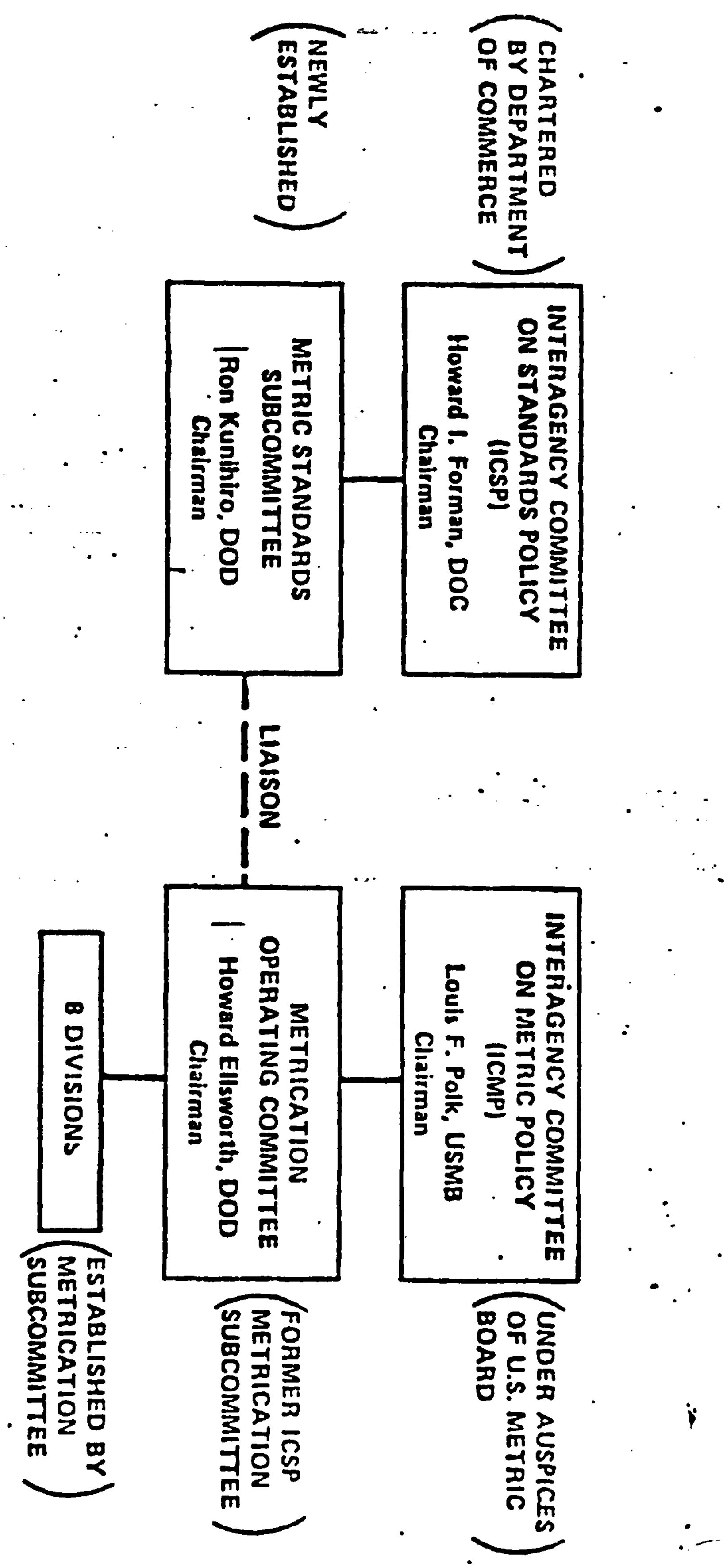
E. Facilitate coordination among agencies in areas related to the subcommittee's responsibilities.

F. Provide information to other subcommittee chairpersons, as appropriate, pertaining to the status of projects, lessons learned, and activities which may assist in the resolution of problems and actions underway which might impact the other subcommittees.

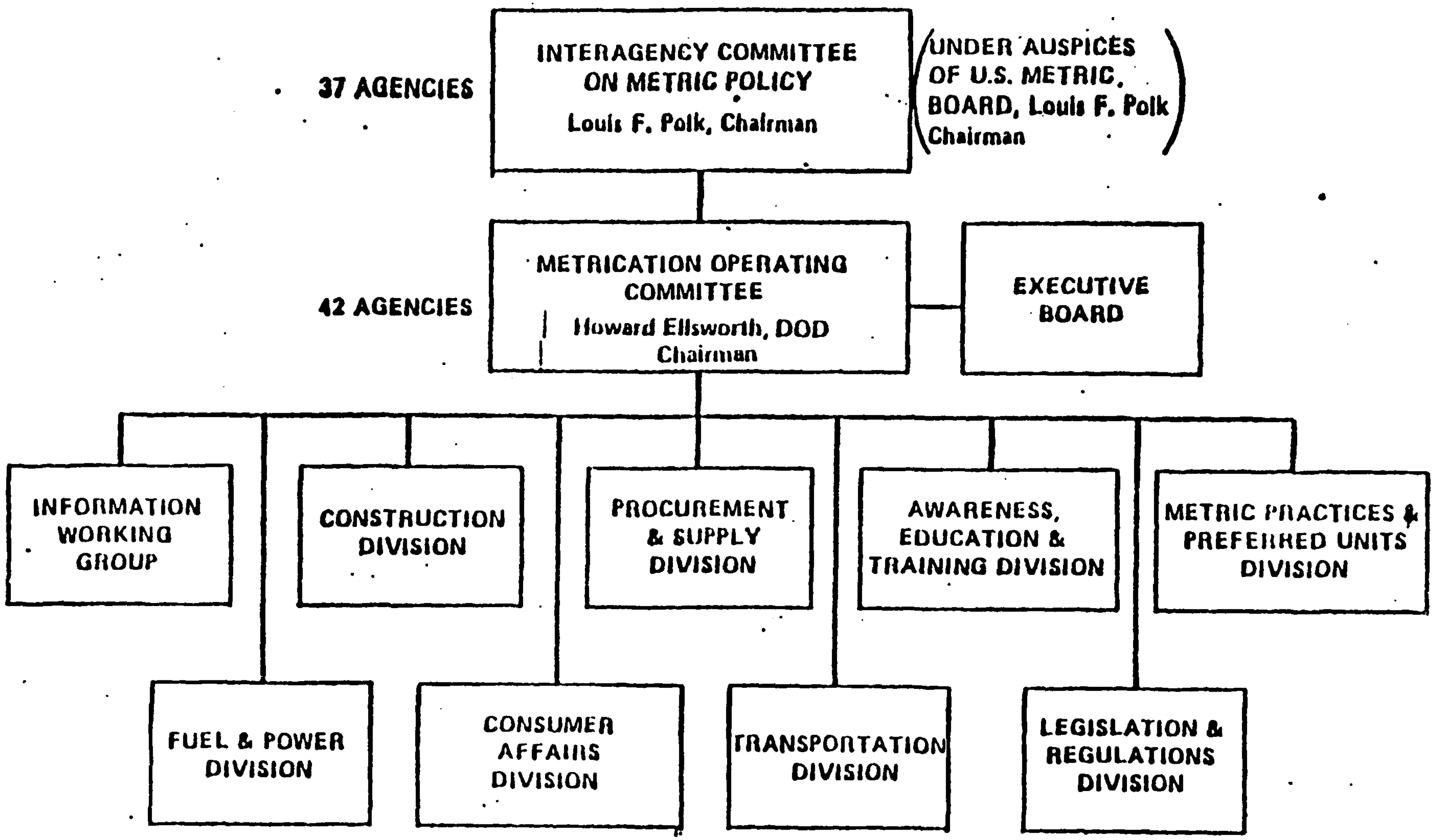
G. Recommend to the Chairperson of the MOC and to the other subcommittee chairpersons actions that should be taken by the MOC and the other subcommittees on tasks affecting his/her subcommittee's mission.

H. Serve as the points-of-contact and liaison representative with other government agencies, industry, public and private organizations, and with groups involved in the subcommittee's metrication mission.

FEDERAL GOVERNMENT METRIC COORDINATION



FEDERAL GOVERNMENT METRIC COORDINATION



Charter of the Metrication Operating Committee (MOC)

of the Interagency Committee on Metric Policy (ICMP)

Purpose and scope

The purpose of the MOC is to undertake tasks assigned to it by the ICMP. Generally, these tasks involve the development of plans, policies, and actions which will facilitate the coordination of metric conversion of the Federal agencies to the metric system of measurement.

Functions

The MOC, in order to facilitate the work of the ICMP, shall undertake functions assigned by the ICMP, including the following:

a. track metric activity within the Federal Government

b. coordinate metrication among Federal departments and agencies

c. prepare recommendations for approval by the ICMP concerning the development of consistent Federal Government metrication policies, plans, and actions

d. resolve technical differences among Federal departments and agencies regarding their implementation of metrication

e. work to eliminate unnecessary duplication of Federal metric activities with those which may be performed outside the Federal Government

f. establish and maintain divisions which are areas of related interests such as transportation, construction, and procurement and supply whose activities have economic, regulatory, operational, educational, or sociological impact, and which involve the responsibilities, operations, and interests of the Federal agencies. The divisions shall report to the MOC.

g. encourage coordination with the private sector

h. bring to attention of the ICMP those matters needing resolution by the ICMP

Membership

1. Any Federal department or independent agency may have a representative on the MOC.

2. The Matrix Coordinator shall be the representative of that department or agency on the MOC.

Administrative Procedures

1. The ICMP Chairman shall designate from the membership of the MOC a chairman and vice chairman.

2. A meeting of the MOC shall be conducted only when a quorum is present at the commencement thereof. One-third of the membership of the MOC shall constitute a quorum. Meetings of the MOC shall be called by the chairman or at request of five members.

3. Persons not members of the MOC may be invited to attend meetings, to contribute to discussions, and to provide information.

4. The MOC may establish a steering group, subcommittees, and divisions as deemed appropriate.

5. The MOC may draft other administrative or operating procedures as necessary, consistent with its purpose and functions and consistent with the ICMP charter and policies.

Duration

The MOC shall serve at the pleasure of the ICMP.

INTERAGENCY COMMITTEE ON METRIC POLICY

Federal Metric Policy and Guidelines; Notification of "Metric Conversion Policy for Federal Agencies" and "Federal Agency Guidelines for Implementation of Metric Conversion Policy"

The Federal Interagency Committee on Metric Policy (ICMP) is publishing this Notice to alert interested parties to the existence of the Metric Conversion Policy for Federal Agencies and the accompanying Federal Agency Guidelines for Implementation of Metric Conversion Policy. These two documents were developed by the ICMP to provide guidance to Federal agencies in their metrication activities.

Comments on these documents are welcomed and should be addressed to Howard B. Ellsworth, Chairman, Metrication Operating Committee of the ICMP.

Howard B. Ellsworth, OUSD (R&E) SS
Department of Defense, Room 3A318, Pentagon, Washington, D.C. 20310 (202) 695-7915

The text of the two documents follows.

Metric Conversion Policy For Federal Agencies

June 11, 1979

Purpose

The purpose is to state for Federal agencies a policy for the increasing use of the metric system within the Federal government. The metric system, for the purpose of this document, means the International System of Units as established by the General Conference on Weights and Measures in 1960 and as interpreted or modified for the United States by the Secretary of Commerce.

Background

On July 28, 1866, the United States adopted the *Use of the Metric System of Weights and Measures Act of 1866* (14 Stat. 339), which legalized the use of the metric system throughout the United States. On May 20, 1875, the United States signed the *Treaty of the Meter* (20 Stat. 709), which provided for an International Bureau of Weights and Measures, an International Committee of Weights and Measures, and for a General Conference on Weights and Measures. In recognition of the fact that the International System (SI), as defined by the General Conferences on Weights and Measures since 1960, has now become the uniform internationally accepted system for weights and measures, many sectors of the United States have already started metrication. On December 23, 1975, the President signed the *Metric Conversion Act of 1975* (Public Law 94-168, 15 USC 205a), which (1) declared that the policy of the United States shall be to coordinate and plan the increasing use of the metric system in the United States, and (2) established the U.S. Metric Board to coordinate the voluntary conversion to the metric system.

Policy Statement

Federal agencies shall conduct their metrication activities in a coordinated manner consistent with the objectives of the Metric Conversion Act and compatible with metric conversion trends in the nation. (Section 3 of the Act declares that the policy of the United States shall be to coordinate and plan the increasing use of the metric system in the United States.) Federal agencies shall encourage and support an environment which facilities metrication. Each Federal agency shall develop plans, allocate sufficient resources, and take actions to:

1. Actively undertake coordination and planning for metric conversion, taking into account the interests, views and conversion plans of other Federal agencies, states and affected parties in the private sector.

2. Identify the areas where metrication is dependent upon the agency's initiative and take appropriate action.

3. Identify the areas where metrication is dependent upon initiatives outside the agency which impact the agency and take appropriate action.

4. Maximize benefits and minimize costs in areas impacted by the agency's program.

5. Facilitate public understanding of, and participation in, metrication activities in agency programs.

6. Identify problems associated with metrication activities in areas impacted by the agency's programs, and appropriately assist in the resolution of these problems.

Each agency shall: 1. Establish the necessary guidelines and structure to adequately carry out the policy.

2. Designate a key executive with the authority to establish intra-agency policies for metrication and to represent and speak for the agency in interagency forums.

3. Identify on a continuing basis measurement-sensitive policies and procedures for which it is responsible, and prepare new or revised regulations, standards, specifications, procurement policies, and, if appropriate, legislative proposals, to remove barriers to metric conversion.

Federal Agency Guidelines for Implementation of Metric Conversion Policy

October 25, 1979

Purpose

These guidelines are to be used to support and implement the metric conversion policy for agencies of the Federal Government. The intent is to clarify the basic Federal policy and assist in the development and coordination of cost-effective metrication activities and programs. The metric system, for the purpose of this document, means the International System of Units as established by the General Conference on Weights and Measures in 1960 and as interpreted or modified for the United States by the Secretary of Commerce.

1. Each agency shall develop a capability to identify and to implement metric conversion initiatives including the associated time frames for their initiation and completion. This shall include the capability for coordination with other agencies.

2. The allocation of agency resources for metric implementation should be accepted as part of the ongoing activities of the agency.

3. Each agency shall immediately establish practices that raise its employees' awareness and understanding of the change to the metric system.

4. Each agency shall develop education and training plans, as applicable, in metric usage.

5. Each agency shall adopt metric units and practices unless there are substantial reasons against such actions. Justification for not adopting such metric usage shall be reviewed periodically.

6. When the private sector has a capability to provide metric products or services at reasonable cost, the agency will, at the earliest possible time, give priority to the acquisition and use of such metric products or services to the maximum extent permitted by existing law and policy. Small business capability will be considered in development of agency policies and procedures as required by Federal law.

7. Each agency's use of the metric system in its activities and products shall be consistent with statutory, operational, economic, technical, and safety considerations. Each agency shall include such considerations as an integral part of its metrication activities.

8. Each agency, recognizing the long term nature of the public acceptance process, shall immediately begin to develop and implement plans for involving, informing and educating the various publics affected by the specific metrication activities under way in the agency's programs. Included shall be:

a. Information on upcoming metrication.
b. The schedule of such conversions.
c. The justification of the conversions.
d. Provision for a mechanism to assure public participation and comment.
e. Explanation of the applicable metric units and practices.
f. The progress of conversion.

9. Each agency shall provide representatives, advisors, and/or participants to metrication groups in the private sector as appropriate in order to monitor and/or coordinate agency activities with private sector planning.

10. Each agency shall recognize the Interagency Committee on Metric Policy (ICMP) as the policy-coordinating group for the Federal Government, and that the ICMP representatives are expected to be able to speak for their respective agencies on metric policy matters.

11. Each agency shall designate an Agency Metric Coordinator, who shall serve as a member of the Metrication Operating Committee (MOC). The agency shall also appoint, as appropriate, agency individuals to actively participate in the activities of the various MOC subcommittees.

Dated: December 28, 1979.

Howard B. Ellsworth,

Chairman, Metrication Operating Committee of the ICMP.

[FR Doc. 80-[illegible] Filed 1-7-80; 8:45 am]
BILLING CODE [illegible]

SELECTED – DOD METRIC PROJECTS

NAME	% METRIC	REASON
AN/TPS 58 RADAR	90	DERIVATIVE OF JOINT FRENCH/GERMAN RADAR
HELLFIRE	100 (SOFT CONVERSION) (NEW CHANGES TO BE HARD METRIC)	BECAUSE OF PLANNED US/NATO APPLICATION ALL INCH/POUND DIMENSIONS HAVE BEEN CONVERTED TO THEIR METRIC EQUIVALENTS IN DRAWINGS, SPECIFICATIONS AND TECHNICAL PUBLICATIONS
SINGLE CHANNEL GROUND/AIRBORNE VHF RADIO (SINGARS)	100	BECAUSE OF PLANNED US/NATO APPLICATION (SYSTEM IS IN DEVELOPMENT)
ROLAND	95	DERIVATIVE OF THE JOINT GERMAN/FRENCH MODE
VIPER	15	WARHEAD ENTIRELY METRIC TO PERMIT JOINT US/NATO OPERATION AND SUPPORT
XM 230E GUN	80 (APPROX)	IS THE SMOOTH BORE 120 mm GERMAN GUN FOR THE XM-1 TANK. DECISION ON METRICATION OF THE BREACH AND MOUNTINGS NOT YET MADE
~~MX MISSILE~~	~~50~~	EXPECTED TO REMAIN IN INVENTORY (1990s) ~~DURING US METRIC TRANSITION PERIOD~~
VEHICLE RAPID FIRE SYSTEM	100	GUN INTENDED FOR JOINT US/NATO USE ON INFANTRY FIGHTING VEHICLES
XM 1 TANK	5 TO 7	ALL FASTENERS AND RELATED TOOLS ARE METRIC
DIVAD	10 TO 15	WILL HAVE METRIC TOOLS, FASTENERS, AMMO AND GUN PARTS. FURTHER METRICATION LIMITED TO NON-AVAILABILITY OF CONTRACTOR PRODUCED ITEMS

DOD DATA MANAGEMENT POLICIES

YESTERDAY, TODAY, AND TOMORROW

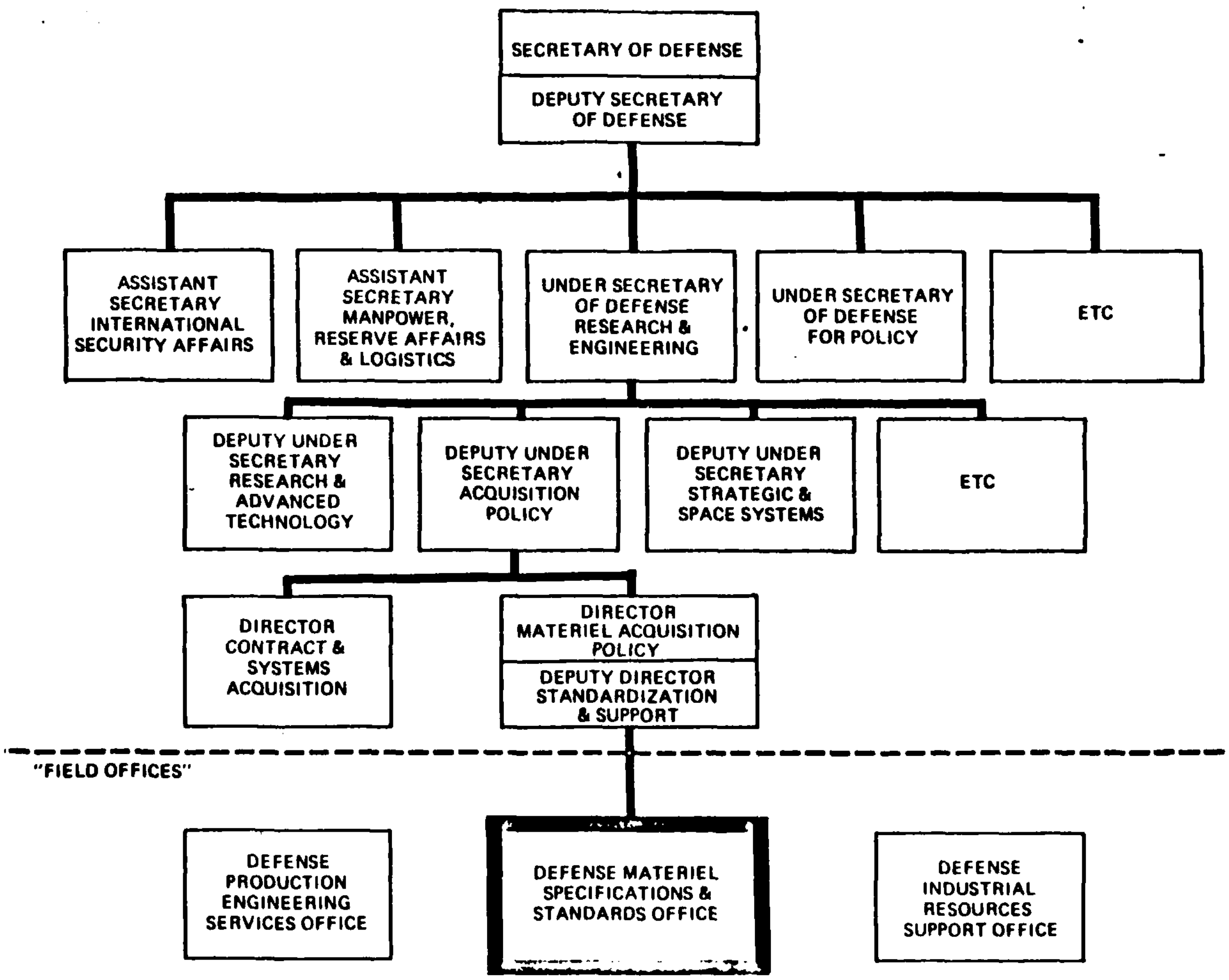
Mr. Donald R. Mitchell

Defense Materiel Specifications and Standards Office
Office of the Under Secretary of Defense
Research and Engineering

"THOSE WHO CANNOT REMEMBER THE PAST

ARE CONDEMNED TO REPEAT IT."

GEORGE SANTAYANA
1863-1952



DEFENSE MATERIEL SPECIFICATIONS AND STANDARDS OFFICE

DIRECTIVES / PUBLICATIONS

DoDI 2045.2	AGREEMENTS WITH AUSTRALIA AND CANADA FOR QUALIFICATION OF PRODUCTS OF NON-RESIDENT MANUFACTURERS
DoDD 4120.3	DEFENSE STANDARDIZATION AND SPECIFICATION PROGRAM
DoD 4120.3M	DEFENSE STANDARDIZATION MANUAL
DoDD 4120.11	STANDARDIZATION OF MOBILE ELECTRIC POWER GENERATING SOURCES
DoDD 4120.18	METRIC SYSTEM OF MEASUREMENT (SUBSEQUENTLY TRANSFERRED)
DoDI 4120.19	DEPARTMENT OF DEFENSE PARTS CONTROL SYSTEM
DoDI 4120.20	DEVELOPMENT AND USE OF NON-GOVERNMENT SPECIFICATIONS AND STANDARDS
DoDD 4120.21	SPECIFICATIONS AND STANDARDS APPLICATION
DoDI 4151.9	TECHNICAL MANUAL (TM) MANAGEMENT
DoDI 5010.12	MANAGEMENT OF TECHNICAL DATA
DoDD 5010.19	CONFIGURATION MANAGEMENT

DEFENSE MATERIEL SPECIFICATIONS AND STANDARDS OFFICE

DIRECTIVES / PUBLICATIONS (CONT'D)

DoDISS	DEPARTMENT OF DEFENSE INDEX OF SPECIFICATIONS AND STANDARDS
SD-1	STANDARDIZATION DIRECTORY
SD-4	STATUS OF STANDARDIZATION PROJECTS
SD-6	PROVISIONS GOVERNING QUALIFICATION (QUALIFIED PRODUCTS LIST)
MIL-STD-961	OUTLINE OF FORMS AND INSTRUCTIONS FOR THE PREPARATION OF SPECIFICATIONS AND ASSOCIATED DOCUMENTS
MIL-STD-962	OUTLINE OF FORMS AND INSTRUCTIONS FOR THE PREPARATION OF MILITARY STANDARDS AND MILITARY HANDBOOKS

ENGINEERING DRAWINGS

SPECIFICATIONS

BEFORE	1959	INDIVIDUAL SERVICE SPECIFICATIONS (ORDM-4-4, MIL-D-5028, OSTD-599)
	1957	PROJECT FOR A SINGLE SPECIFICATION
	1959	MIL-D-70327 - TWO CLASSES
	1965	MIL-D-1000 - THREE FORMS, 10 CATEGORIES
	1975	MIL-D-1000A - THREE LEVELS
	1977	DOD-D-1000B - REFINEMENT OF REVISION A
	1978	ADDED ADDENDUM TO 1000B

STANDARDS

BEFORE	1965	SEPARATE LOW-NUMBERED MIL-STD's
	1965	COMBINED INTO MIL-STD-100
SINCE	1965	REFINEMENTS, ADOPTION OF NON-GOVERNMENT STANDARDS

FUTURE

COMPUTER ARRIVES?

SOME TECHNICAL DATA MANAGEMENT MILESTONES

ABOUT 1960 - NAVY REGULATION ESTABLISHED DATA PRICE GROUPS

1962 - AF MONTEREY CONFERENCE

- DoD DIRECTIVE 5100.36 - TECHNICAL INFORMATION

1962 / 3 - AIR FORCE FORM 9, DD 1423 FORM (MAXIMUM / MINIMUM CONCEPT)

1963 - TECHNICAL AND LOGISTICS DATA COMMITTEE

1964 - DoD INSTRUCTION 5010.12 - TECHNICAL DATA MANAGEMENT

- DD 1664 REPLACED SERVICE FORMS (DA FORM 3149R, FORM 9, DSA 402, NSA C-7888)
- ASPR IMPLEMENTS "LIMITED RIGHTS" CONCEPT

1965 - DoD INSTRUCTION 5010.12 EXPANDED -- DATA PRICING, DEFERRED ORDERING

- AF / AIA SYMPOSIUM
- SMAG REPORT

1966 - CODSIA STUDY INITIATED (MANAGEMENT SYSTEMS)

1967 - HOUSE APPROPRIATIONS COMMITTEE REPORT

1968 - CODSIA REPORT COMPLETED

- DoD INSTRUCTIONS 5000.6 AND 5000.7 ISSUED (DD FORM 1660 & AMSL)
- PRESENT DoD INSTRUCTION 5010.12 ISSUED

TECHNICAL DATA MANAGEMENT MILESTONES CONT'D

- CONGRESS CUTS $75 MILLION
- MANUAL 5010.12M STARTED AND DIED

1970 - HARBRIDGE HOUSE REPORT
- DoD DIRECTIVE 5000.19 ISSUED (INFORMATION REQUIREMENTS)

1971 - RECOMENDATIONS A33 AND A34, COMMISSION ON GOVERNMENT PROCUREMENT
- DoD INSTRUCTION 5010.29 ISSUED, ACQUISITION OF DATA
- MANUAL 5010.29R INITIATED

1973 - 5010.29R KILLED

1975 - DECISION TO COMBINE DATA AND MANAGEMENT SYSTEMS UNDER OSD COMPTROLLER
- DEPUTY SECRETARY MEMORANDUM, REVIEW BOARDS

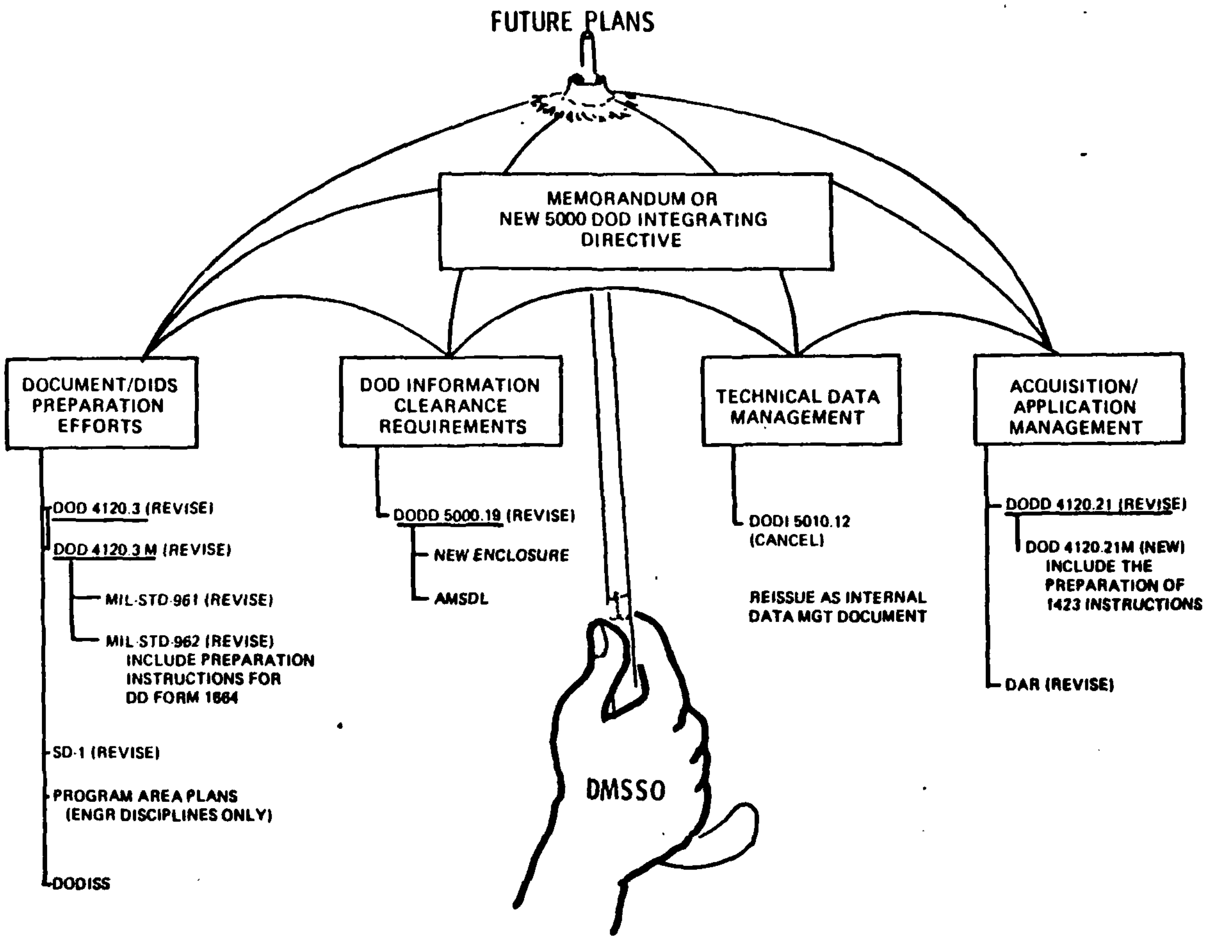
1976 - MAJOR REVISION OF 5000.19 ADDS DATA MANAGEMENT POLICIES
- TECHNICAL DATA ACQUISITION STUDY SENT TO CONGRESS

1977 - DoD INSTRUCTION 5000.32 REQUIRED MANUAL 5000.32M ON DATA ACQUISITION
- DEFENSE SCIENCE BOARD (SHEA) REPORT

1979 - 5000.32M SHOT DOWN
- DATA ACQUISITION TRANSFERRED TO USDR&E

PRINCIPLES AGREED UPON BY SERVICES

- NON-PRODUCT (SOURCE) DOCUMENTS USED IN CONTRACTS REPETITIVELY SHOULD BE MIL-STDs (EXCEPT CURRENT MIL-SPECs)
- DATA ITEM DESCRIPTIONS (DIDs) SHOULD NOT CONTAIN CONTRACT TASKS
- DATA ITEM DESCRIPTIONS (DIDs) SHOULD RELATE TO TASKS IN SOURCE DOCUMENTS, BE PREPARED AT SAME TIME BY SAME PREPARING ACTIVITY, AND BE SCREENED, VALIDATED AND APPROVED CONCURRENTLY
- PROVISION MUST BE MADE FOR "ONE TIME" DID's PREPARED LOCALLY
- STANDARDIZATION PLANS SHOULD ADDRESS DID's / SOURCE DOCUMENTS
- INFORMATION CLEARANCE REQUIREMENTS OF DoDD 5000.19 APPLY
- CHAIN REFERENCING SHOULD BE LIMITED
- PROCEDURES MANDATORY ON LARGE PROCUREMENTS
- DAR CLAUSES EXCLUDED
- DATA ACCESSION TECHNIQUE TO BE LIMITED



DEFENSE STANDARDIZATION AND
SPECIFICATION PROGRAM (DSSP)

BACKGROUND

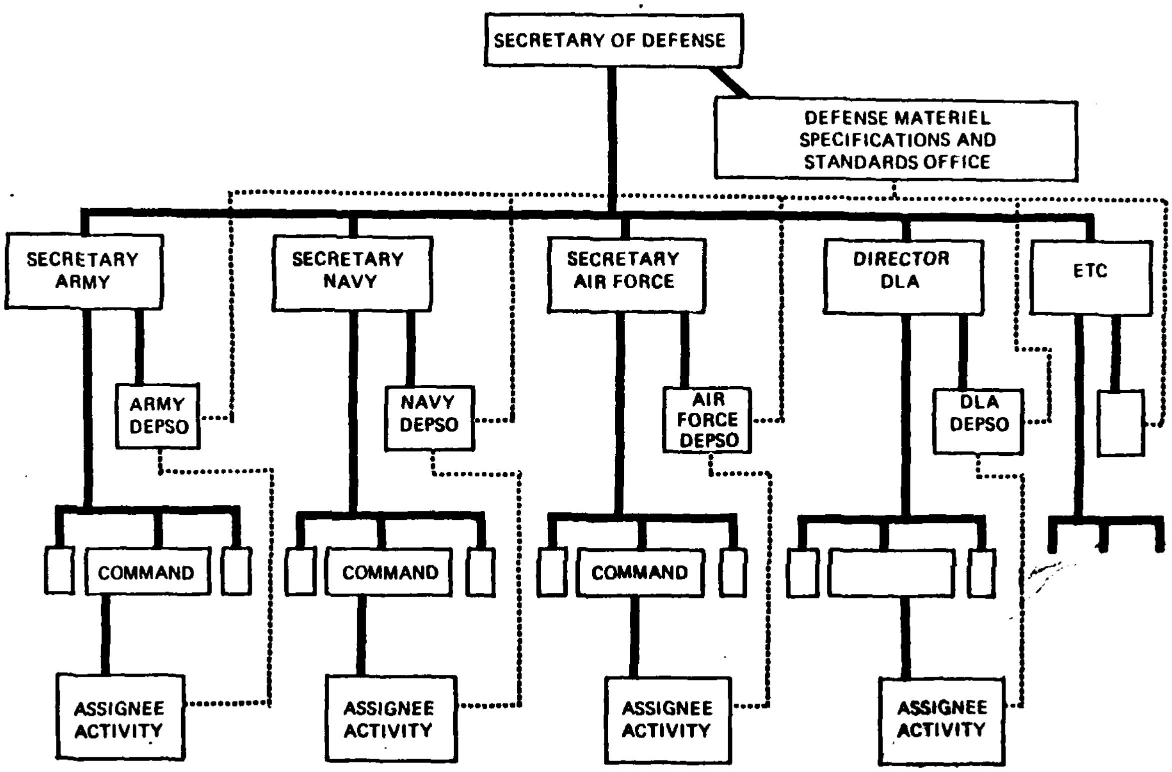
1921	STANDARDS DIVISION, WAR DEPARTMENT
1937	AERONAUTICAL STANDARDS "WORKING COMMITTEE"
1943	FIRST "JAN" SPECIFICATION
1945	JOINT ARMY-NAVY SPECIFICATION BOARD
1951	NEW ARMY / NAVY / AF SPECIFICATIONS / STANDARDS PROHIBITED
1952	DEFENSE CATALOGING AND STANDARDIZATION ACT (PL 436)
1953	DOD DIRECTIVE 4120.3
1954	PROGRAM DECENTRALIZED
1955	ALL SPECIFICATIONS / STANDARDS CONVERTED TO "MIL"
1973	DEFENSE MATERIEL SPECIFICATIONS AND STANDARDS OFFICE ESTABILSHED TO MANAGE PROGRAM

DEFENSE CATALOGING AND STANDARDIZATION ACT

(PL 436, 1952)

- NAME, DESCRIBE, CLASSIFY, AND NUMBER EACH ITEM ... IN SUCH MANNER THAT ONLY ONE DISTINCTIVE COMBINATION OF LETTERS OR NUMERALS OR BOTH WILL IDENTIFY THE SAME ITEM...
- ACHIEVE HIGHEST PRACTICAL DEGREE OF STANDARDIZATION
- DEVELOP AND USE SINGLE SPECIFICATIONS
- ELIMINATE OVERLAPPING AND DUPLICATING SPECIFICATIONS
- REDUCE NUMBER OF SIZES, KINDS OR TYPES OF GENERALLY SIMILAR ITEMS
- STANDARDIZE PACKAGING
- INSPECT AND TEST EFFICIENTLY

SYMBOLIC RELATIONSHIPS OF MANAGEMENT OFFICES



DELEGATION OF MANAGEMENT RESPONSIBILITIES
(PLANNING, ASSIGNMENT OF PROJECTS, DECISIONS -- SUBJECT TO APPEAL)

BY NATIONAL SUPPLY CLASSES - (APPROXIMATELY 600 CLASSES):

E.G. NSC 1005 - GUNS THRU 30mm - ARMY
NSC 5305 - SCREWS - DLA
NSC 6105 - ELECTRIC MOTOR - NAVY

BY MANAGEMENT DISCIPLINE AREAS (APPROXIMATELY 30 AREAS):

E.G. EDMS - ENGINEERING DATA MICROREPRODUCTION - AIR FORCE
DRPR - DRAFTING PRACTICES - ARMY
CMAN - CONFIGURATION MANAGEMENT - NAVY

TERMS USED IN DELEGATION OF AUTHORITY (TERMS USED)

STANDARDIZATION MANAGEMENT

FOR EACH NSC OR AREA:

ASSIGNEE ACTIVITY (FIELD ACTIVITY WITHIN ASSIGNEE DEPARTMENT)

PARTICIPATING ACTIVITY (EACH OTHER DEPARTMENT)

STANDARDIZATION DOCUMENTS

FOR EACH DOCUMENT:

PREPARING ACTIVITY (FIELD ACTIVITY WHICH PREPARES DOCUMENT)

CUSTODIAN (SPEAKS FOR EACH OTHER DEPARTMENT)

REVIEW ACTIVITIES (REVIEW AND COMMENT)

USER ACTIVITIES (MAY COMMENT IF DESIRED)

TYPES OF DOCUMENTS

- SPECIFICATIONS
- COMMERCIAL ITEM DESCRIPTIONS (NEW TYPE)
- STANDARDS
- HANDBOOKS
- QUALIFIED PRODUCT LIST
- NON-GOVERNMENT (VOLUNTARY) STANDARDS

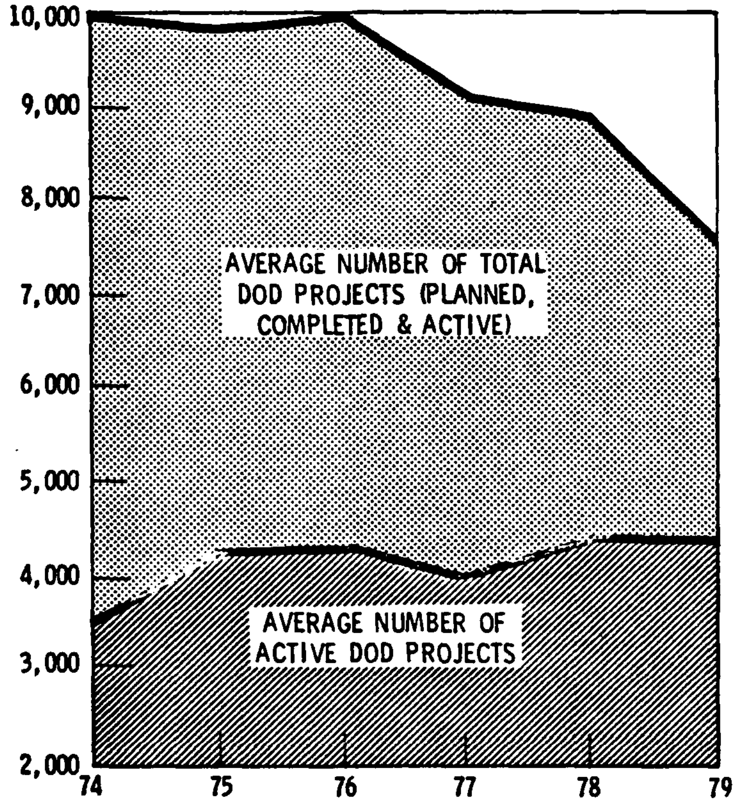
QUANTITIES OF ACTIVE DOCUMENTS

MILITARY SPECIFICATIONS	27,465
MILITARY STANDARDS	6,804
FEDERAL DOCUMENTS (SPECIFICATIONS, STANDARDS, ETC.)	4,525
NON-GOVERNMENT STANDARDS ADOPTED	2,186
QUALIFIED PRODUCTS LISTS	1,608
OTHER DoDISS DOCUMENTS	1,965
TOTAL	44,563

TYPES OF STANDARDIZATION PROJECTS

- DOCUMENT PREPARATION: (SPECIFICATIONS, STANDARDS, ETC.)
- ADOPTION OF NON-GOVERNMENT STANDARDS
- STUDIES
  - ITEM REDUCTION (REDUCE ITEMS FROM STOCK)
  - ENGINEERING PRACTICES

DOD STANDARDIZATION PROJECT
STATUS



DOCUMENT MAINTENANCE

DOCUMENTS ARE MAINTAINED THROUGH:

1. KNOWLEDGE OF STATE-OF-THE-ART CHANGES
2. FEEDBACK OF PROCUREMENT PROBLEMS
3. FEEDBACK FROM USERS (DD FORM 1426 ON BACK OF EACH DOCUMENT)
4. FIVE-YEAR REVIEW PROGRAM

PRIORITY PROGRAMS

- PROCUREMENT SUPPORT
- APPLICATION / TAILORING
- MANAGEMENT OF HIGH COST AREAS
- COMMERCIAL ACQUISITION
- NATO
- METRIC
- ADOPTION OF NON-GOVERNMENT STANDARDS
- ENVIRONMENTAL / ECOLOGY PROGRAMS

EVENTS IMPACTING ON FUTURE OF STANDARDIZATION

- "BUY COMMERCIAL" POLICY
- METRIC CONVERSION
- INCREASED INTERNATIONAL STANDARDIZATION
- USE OF NON-GOVERNMENT (VOLUNTARY) STANDARDS
- FURTHER OFF -- COMPUTER SELECTION -- COMPUTER GRAPHICS

DOD DRAWING PRACTICES

STANDARDIZATION

PROGRAM PLAN

Mr. Maurice E. Taylor

Army Armament Research and Development

Command

DEPARTMENT OF DEFENSE

DRAWING PRACTICES

DRPR

STANDARDIZATION DOCUMENT

PROGRAM

PLAN

DRAFT

I. EXECUTIVE SUMMARY AND SCOPE

A. BACKGROUND

This Program Plan provides a time-phased delineation of tasks required to update existing documents to overcome the obsolescence, overlap, and voids in drawing practice documents and incorporate new documents required to maintain the latest state-of-the-art as defined by the scope of the Drawing Practices Standardization Area (DRPR).

In conjunction with such tasks, extended efforts have been made, and will continue to be made, to implement the findings and recommendations made by the Defense Science Board Task Group on Specifications and Standards as related to the DRPR Program.

The objectives of the DRPR Standardization Program Plan are to:

1. Develop and maintain a program to standardize engineering drawings and related practices used by DoD activities and their contractors, for the design, development, production and maintenance of military equipments and systems.

2. Insure compatibility with national practices and as far as practicable, international practices.

3. Provide the necessary leadership, representation and inputs into corresponding national standardization and related international standardization activities impinging on engineering drawing preparation to ensure adequate coverage of military requirements and design disclosure.

4. Continuously monitor ongoing effort in the preparation, use and maintenance of engineering drawings to ensure compatibility.

5. Maintain military drawing practices consistent with National and International practices.

6. Appraise the effectiveness of the implementation of the documents of this program and correct the deficiencies noted through the appropriate channels.

The thrust of this Program Plan is to define, schedule, manage and control the necessary standardization activities within the DoD, reflect the concurrence and commitment by the services to the accomplishment of specific assignments within scheduled milestones.

The overall benefits which should result include the establishment of enforceable requirements, avoidance of unnecessary requirements and overall decreased costs.

B. PURPOSE & SCOPE

The purpose of this Program Plan is to establish and maintain centralized management of the drawing practices documents within DoD, in accordance with the policies set forth in DoD Directives. This Program Plan provides the overall assessment of DRPR documents, including DODISS, Non-DODISS, Data Item Descrpitions and Non-government and associated documents. It establishes and monitors the status of standardization tasks necessary to overcome deficiencies such as obsolescence, redundancy, conflicts, and voids in those documents within the scope of the DRPR Area, and assigns those tasks to appropriate DoD activites. New tasks will be added to the Program Plan as the need arises.

The scope of the Drawing Practices, DRPR Area relates to engineering practices to define, record and communicate concepts and design and production requirements in a concise graphic form with standard practices, symbols, abbreviations and text on drawings and associated lists.

This Program Plan will serve as an effective management tool for decision making at all levels of participation within the DoD.

II. SUMMARY OF COORDINATED PROGRAMS

This Program Plan encompasses a continuing effort in all associated fields of standardization to ensure a significant response to the state-of-the-art in engineering practices and requirements, and to be responsive to the scrubbing of documents and the elimination of "high-cost-driver" specifications and requirements. High-cost-driver specifications, standards and requirements are defined as those documents used in procurement which contain requirements in excess of those needed for a specific acquisition. This Program Plan endorses the policies contained in OMB Circular A-109, DoD Directive 4120.21 and DAR 1-1201 regarding the application and tailoring of specifications and standards to achieve cost effective acquisition and life cycle ownership of defense materiel. The Preparing Activity for each DRPR Task shall be responsible for ensuring that these policies are reflected in each DRPR document.

A focal point in this effort is the continual review and revision of DOD-D-1000 and DOD-STD-100. Incorporated within this field of endeavor is the adoption of non-government standards which meet the requirements of the military. Significant factors to be considered in the DRPR Program Plan is the assignment of tasks and the scheduling of milestones, as almost 50% of the active documents listed in the DRPR Area are DoD adopted non-government documents. Therefore, a continuous monitoring action is in effect at all times to ensure that DoD effort is coordinated with the industry standards committees planning and approval cycles. In relation to this activity, it is proposed the DOD-STD-100 cover only those requirements not provided adequate support in existant and available non-government standardiza-

tion documents. Also, as other non-government standards relating to graphic symbols and engineering drawing practices are developed and accepted by the DoD, they will be incorporated within DOD-STD-100 to provide a well-rounded reference of applicable documents for the preparation of engineering drawings and associated lists.

A concentrated effort is continually being made to ensure actions taken internationally, both industry (IEC-ISO-etc.) and military (ABCA Army-Navy/ ASCC/NATO-etc.) are monitored and participated in, to determine impact, inclusion, etc., on national standards (non-goverment/military). These efforts have been quite significant in the DRPR Program due to the increase of off-shore procurements and multinational programs.

Some of the international and national standardization activities supporting the coordinated DRPR Standardization Program Plan are:

ISO International Standards Organization

IEC International Electrotechnical Commisssion

ABCA Army-QWG/ES, American-British-Canadian-Australian Army - Quadripartite Working Group/Engineering Standardization

ABCA Navy-Field Z, American-British-Canadian-Australian Navy - Field Z

ASCC-WP 104 Air Standardization Coordination Committee-Working Party 104

NATO-AC 301 North Atlantic Treaty Organization - AC301

The activities of the standards committees of the following organizations has resulted in the promulgation of a significant number of non-government engineering standards which have incorporated DoD requirements and have been adopted by the DoD. This is in compliance with DoD policy to use, where possible, non-government standards that will meet the needs of the military:

1. American National Standards Committees (ANSI)

a. Y1 - Abbreviations

b. Y10 - Letter Symbols

c. Y14 - Drawing Practices

d. Y32 - Graphic Symbols and Designations

2. American Welding Society (AWS)

3. Society of Automotive Engineers (SAE)

4. American Society of Mechanical Engineers (ASME)

5. Institute of Electrical and Electronics Engineers (IEEE)

6. Institute of Interconnecting and Packaging Electronic Circuits (IPC)

7. American Defense Preparedness Association (ADPA)

8. Electronic Industries Association (EIA)

9. Aerospace Industries Association of America, Inc. (AIA)

A continuing effort has been underway in the DRPR area to ensure these industry association standardization committees, in which the DoD has an interest, have adequate military representation and the military requirements are incorporated during the draft stages of the proposed or revised documents. In addition, preparing and coordinating activities will maintain liaison with industry association and standards making organizations to foster an exchange of information and recommendations for obtaining more cost effective non-government DRPR standards.

A significant milestone has been the relationship of the DoD Select Committee on DOD-D-1000 and industry. The forums for this dialogue have been the combined meetings of the DoD Select Committee and selected industry representatives and participation in industry seminars and workshops on DOD-D-1000 and DOD-STD-100, hosted by such organizations as: American Defense Prepardness Association, Electronic Industries Association, etc. The results has been, and will continue to be, improved documents with requirements that meet the needs of the military with the support of industry.

The impact and implementation of "metrication" on documents in the DRPR program is continually being monitored.

In the overall DRPR Area, considerations will be given to the impact of Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM) on the DRPR documents. It is recognized that technological advancements will provide an impetus to incorporate the requirements that would be a part of the standardization program as related to CAD/CAM.

The DRPR Program concept has been to exclude design documents as part of the DRPR Program. It has become more difficult to differentiate between design and drawing practices. As part of the long range program, analysis will be made of recognized design documents (in whole or in part) to determine, if and when, a design standard or specification should be part of the DRPR Area. This is especially true of non-government documents.

Data Item Description (DIDS) - Responsibility for the content of contract data requirements (DIDS Form 1664) is assigned to the preparing or coordinating activity of the specification/standard (source document). Referent contract data requirements shall be reviewed, consolidated and updated or cancelled concurrent with the preparation or revision of the source document. Updating of the Acquisition Management Systems and Data Requirements Control List (AMSDL) will be made for those associated DID's listed in the DRPR Plan as well as those DID's which are later identified as being associated with a DRPR document. Associated data item descriptions are listed with each task to the extent that they could be identified; however, this list may not be complete and will be revised as other applicable data item descriptions are identified, consolidated or cancelled.

With each task assignment will be the determination, if any, of the present DRPR documents that should be part of another area assignment.

The DRPR Program Plan has been organized into two major categories which provide the frame work for a total management program: Military Document; Non-Government Documents.

III. OTHER RELATED ACTIONS

Upon approval of this Program Plan, documents listed in Appendix B will be cancelled.

IV. MILESTONE SCHEDULES

Table IV-1 thru IV-3 "Milestone Schedules" represent a graphic presentation of the work required and the schedule by which accomplishments will be measured. All progress will be monitored and adjustments made to the schedule as required.

MILESTONE SCHEDULE

CATEGORY	TASK IDENTIFICATION	P.A.	DOCUMENT TITLE
DRPR 1 Government Documents	80 DRPR 1-001 (DRPR-0216)	AR	Abbreviations for Use on Drawings, Specifications, Standards and in Technical Documents MIL-STD-12.
	80 DRPR 1-002 (DRPR-0219)	16	Data, Engineering and Technical, Reproduction, Requirements for MIL-D-5480.
	80 DRPR 1-003 (DRPR-0226)	AR	Engineering Drawing Practices DOD-STD-100C, Notice 1.
	80 DRPR 1-004 (DRPR-0227)	AR	Engineering Practices Study-Review of Data Item Descriptions Cross-Referenced to MIL-STD-100A and MIL-STD-100B.
	80 DRPR 1-005 (DRPR-0228)	AR	Engineering Practices Study - Specification and Source Control Drawing Requirements.
	80 DRPR 1-006 (DRPR-0229)	AR	Engineering Practices Study - Technology Transfer of Product Definition Data by other than Engineering Drawings.
	80 DRPR 1-007 (DRPR 0234)	16	Engineering Practices Study - Hardness Critical Identification on Engineering Drawings and Associated Lists.
	80 DRPR 1-008 (DRPR 0235)	AR	Engineering Practices Study - Review of Data Item Descriptions Cross Referenced to MIL-D-1000 and DOD-D-1000
	80 DRPR 1-009 (DRPR 0236)	AR	Engineering Practices Study - Review of Data Item Descriptions Cross-Referenced to Government Documents not covered by other DRPR Projects.

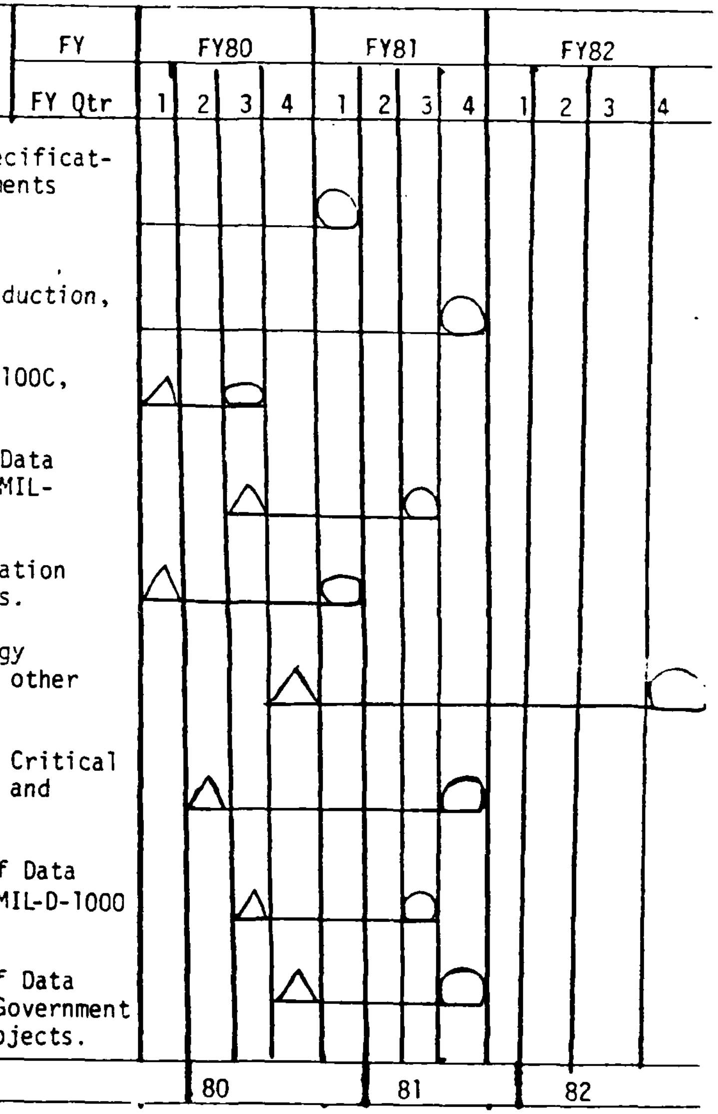


TABLE IV - 1

MILESTONE SCHEDULE

CATEGORY	TASK IDENTIFICATION	P.A.	DOCUMENT TITLE	FY80				FY81				FY82			
			FY Qtr	1	2	3	4	1	2	3	4	1	2	3	4
DRPR 1 Government Documents	80 DRPR 1-010 (DRPR-0238)	AR	Engineering Practices Study - Develop a clearer distinction between Level 2 and Level 3 Drawing Requirements												
	80 DRPR 1-011 (DRPR-0239)	AR	Engineering Practices Study - International Standardization (ISO) of Engineering Drawings and Graphic Symbols (mechanical, architectural, process flow, etc.)												
	80 DRPR 1-012 (DRPR-0240)	AR	Engineering Practices Study - International Standardization (IEC) of Engineering Drawings and Graphic Symbols (Electrical and Electronics)												
	80 DRPR 1-013 (DRPR-0241)	AR	Review of Service Peculiar Drawing Requirements and Implementing Documents being Imposed on Contracts.												
	80 DRPR 1-014 (DRPR-0242)	AR	Engineering Drawing Management Plan												
			CY	80				81				82			

TABLE IV - 2

MILESTONE SCHEDULE

CATEGORY	TASK IDENTIFICATION	P.A.	DOCUMENT TITLE	FY80				FY81				FY82			
			FY Qtr	1	2	3	4	1	2	3	4	1	2	3	4
DRPR 2 Non-Government Documents	80 DRPR 2-001 (DRPR-0221)	AR	ANSI Y14.26.1 Digital Representation of Physical Object Shapes.								◯				
	80 DRPR 2-002 (DRPR-0224)	AR	ANSI Y32.11 Graphic Symbols for Process Flow Diagrams used in the Petroleum and Chemical Industries.	Δ					◯						
	80 DRPR 2-003 (DRPR-0225)	AR	ANSI Y14.1-1975 (Revision) Drawing Sheet Size and Format.	Δ					◯						
	80 DRPR 2-004 (DRPR-0200)	AR	ANSI Y14.24 Types and Application of Engineering Drawings.						◯						
	80 DRPR 2-005 (DRPR-0206)	AR	ANSI Y14.7.3 ANSI Drafting Standard Covering Crossed Helical, Worm, Spiroid, and Helical Gears.						◯						
	80 DRPR 2-006 (DRPR-0207)	AR	ANSI Y14.7.4 ANSI Drafting Standard Covering Splines.						◯						
	80 DRPR 2-007 (DRPR-0172)	AS	ANSI Y14.5 -1973 Dimensioning and Tolerancing.						◯						
	80 DRPR 2-008 (DRPR-0231)	13	IEEE STD 91-1973 Graphic Symbols for Logic Diagrams (Two State Devices) (Same as ANSI Y32.14-1973.								◯				
	80 DRPR 2-009 (DRPR-0232)	AR	ANSI Y14.6M Metric Screw Thread Representation.						◯						
	80 DRPR 2-010 (DRPR-0237)	AR	Engineering Practices Study - Review of Data Item Descriptions Cross-Referenced to Non-Government Documents not covered by other DRPR Projects.				Δ					◯			

CY 80 81 82

TABLE IV - 3

TASK IDENTIFICATION: 80 DRPR 1-002

DOCUMENT NO. & DATE: MIL-D-5480E 15 June 1970

TITLE: Data, Engineering and Technical, Reproduction Requirements For

PROJECT NO.: DRPR-0219

PREPARING ACTIVITY: Air Force - 16

CUSTODIANS: Army - AR
Navy - AS

MILESTONES:

Initiate Project:	2 Qtr 79
Initial Draft:	4 Qtr 80
Coordination:	1 Qtr 81
Project Completion:	4 Qtr 81

PROBLEM/ISSUE/OPPORTUNITY: Document needs updating due to changes in technology f(the reproduction of engineering data by automated equipments.

OBJECTIVE/PURPOSE: Revise specification to reflect current reproducible requirements and as related to the latest techniques for the preparation of drawings and lists by mechanized methods and recognizing the impact of tailoring.

RESOURCES: It is estimated that this task will require six (6) man months of effort by the preparing activity and six (6) man months of effort by custodians and review activities.

ASSOCIATED DATA ITEM DESCRIPTIONS (DIDS):

Title	Document No.
Reproductions	DI-E-1114
Calculations, C.P. Propeller	UDI-E-23134
Reproductions of Engineering and Technical Data	UDI-E-23144A
Calculations	UDI-E-23213
Diagrams, Calculations and Stress	UDI-E-23253
Real Property Facilities - As Built Drawings	DI-S-30575

TASK IDENTIFICATION: 80 DRPR 1-003

DOCUMENT NO. & DATE: DOD-STD-100C 22 December 1978

TITLE: Engineering Drawing Practices

PROJECT NO.: DRPR-0226

PREPARING ACTIVITY: Army - AR

CUSTODIANS: Navy - OS
Air Force - 16

MILESTONES:

Initiate Project:	1 Qtr 80
Initial Draft:	2 Qtr 80
Coordination:	2 Qtr 80
Project Completion:	3 Qtr 80

PROBLEM/ISSUE/OPPORTUNITY: Several editorial errors and minor changes have been identified in DOD-STD-100C.

OBJECTIVE/PURPOSE: Prepare Notice 1 (page revision) of DOD-STD-100C to incorporate editorial changes.

RESOURCES: It is estimated that this task will require one (1) man month of effort by the preparing activity and two (2) man months of effort by custodians and review activities.

ASSOCIATED DATA ITEM DESCRIPTIONS (DIDS): None

TASK IDENTIFICATION: 80 DRPR 1-006

DOCUMENT NO. & DATE: Engineering Practices Study

TITLE: Technology Transfer of Product Definition Data by Other Than Engineering Drawings

PROJECT NO.: DRPR-0229

PREPARING ACTIVITY: Army - AR

CUSTODIANS: Navy - SH
Air Force - 16

MILESTONES:

Initiate Project:	4 Qtr 80
Initial Draft:	3 Qtr 81
Coordination:	1 Qtr 82
Project Completion:	4 Qtr 82

PROBLEM/ISSUE/OPPORTUNITY: Advances in the technology of engineering design has resulted in the accumulation of data in various automated storage media to perform numerous functions independent of the normal graphic display on engineering drawings. In these cases acquisition of normal "engineering drawings" may not be cost effective. The potential overlap between DRPR and Computer Aided Design Numerical Control (CDNC) is recognized; however this subject is not being actively investigated in the (CDNC) area.

OBJECTIVE/PURPOSE: Determine the optimum methods, media, and documentation for transfer of product definition data between contractors and government repositories for competitive reprocurement.

RESOURCES: It is estimated that this task will require one (1) man year effort by the preparing activity and one (1) man year of effort by custodians and review activities.

ASSOCIATED DATA ITEM DESCRIPTIONS (DIDS): None

TASK IDENTIFICATION: 80 DRPR 1-007

DOCUMENT NO. & DATE: Engineering Practices Study

TITLE: Hardness Critical Identification on Drawings and Associated Lists

PROJECT NO.: DRPR-0234

PREPARING ACTIVITY: Air Force - 16

CUSTODIANS: Army - AR
Navy - OS

MILESTONES:

Initiate Projects:	2 Qtr 80
Initial Draft:	4 Qtr 80
Coordination:	1 Qtr 81
Project Completion:	4 Qtr 81

PROBLEM/ISSUE/OPPORTUNITY: Requirement has developed in Air Force for identification of Hardness (Nuclear) Critical Identification on drawings and associated lists.

OBJECTIVE/PURPOSE: Determine requirements and method of identification on drawings and lists of hardness critical items and processes, taking into account information relative to the project, for example; the Joint Logistic Commanders (JLCs) comments pertaining to the impact on maintenance, supply and storage of fielded equipments, AFSC studies, associated DID's, etc.

RESOURCES: It is estimated that this task will require three (3) man months of effort by the preparing activity and two (2) man months of effort by participating activities.

ASSOCIATED DATA ITEM DESCRIPTIONS (DIDS): (From the AMSDL "To Be Determined" List)

Title	Document No.
Nuclear Hardening Information (limited to Cruise Missile Systems)	UDI-S-21422A
Hardness Data Manual Maintenance Document (Limited to Minuteman Contracts only)	DI-M-30412
Nuclear Hardness and Survivability Program Plan (Limited to Minuteman and Missile X contracts only)	DI-S-30553

APPENDIX A

DRPR DOCUMENT LISTING

This appendix lists all documents covered by the scope of the DRPR Standardization Program Plan.

Documents listed and identified by an asterisk (*) are documents with no action planned at this time.

Documents listed and identified as "(cancel)" will be cancelled upon approval of the DRPR Standardization Program Plan.

APPENDIX A

Military Document No.	Title
MIL-STD-8C*	Dimensioning and Tolerancing
MIL-STD-9A (cancel)	Screw Thread Conventions and Methods of Specifying
MIL-STD-12C	Abbreviations for Use on Drawings, Specifications, Standards and in Technical Documents
MIL-STD-14A*	Architectural Symbols
MIL-STD-15*	Electrical Wiring Equipment Symbols for Ships Plans Part 2
MIL-STD-17B-1*	Mechanical Symbols (other than Aeronautical, Aerospacecraft and Spacecraft Use)
MIL-STD-17B-2*	Mechanical Symbols for Aeronautical, Aerospacecraft and Spacecraft Use
MIL-STD-18B*	Structural Symbols
MIL-STD-21A*	Welded-Joint Designs, Armored-Tank Type
MIL-STD-25A*	Ship Structural Symbols for Use on Ship Drawings
MIL-STD-27A*	Designations For Electric Switchgear and Control Devices
MIL-STD-29A*	Spring, Mechanical, Drawing Requirements For
MIL-STD-34*	Preparation of Drawings for Optical Elements and Optical Systems, General Requirements For
DOD-STD-100C	Engineering Drawing Practices
MIL-STD-295*	Bill of Material, Preparation Of
MIL-STD-863B*	Wiring Data and System Schematic Diagrams, Preparation Of
MIL-STD-1174B*	Associated Lists for ARRADCOM Engineering Drawings
DOD-D-1000B	Drawing, Engineering and Associated List
MIL-D-1000/5A(1) (cancel)	Drawings Procurement (Identical Items), for Electronics Command Equipment

APPENDIX A

Military Document No.	Title
MIL-D-1000/6 (cancel)	Drawings Procurement (Identical Items), for Electronics Command Test Fixtures
MIL-D-1000/7 (cancel)	Drawings, Design Evaluation (Industry Standards), for Electronics Command Equipment
MIL-D-1000/8 (cancel)	Drawing, Procurement (Identical Items), for Electronics Command Mechanical Gages and Gage Cases
MIL-D-1000/9(1) (cancel)	Drawing, Procurement (Identical Items), (Industry Standard), for Electronics Command Equipment
MIL-D-1000/10(1) (cancel)	Drawings, Procurement, (Interchangeable Items), for Electronics Command Parts
MIL-D-1000/11 (cancel)	Drawings, Installation, (Industry Standard)
MIL-D-5480E	Data, Engineering and Technical, Reproduction Requirements For
MIL-D-8510B(2)*	Drawings, Undimensioned, Reproducibles, Photographic and Contact, Preparation Of
MIL-A-8836B(1)*	Abbreviated Summary of Bill of Material for Items in Department of the Air Force and Bureau of Naval Weapons Contracts
MIL-D-9898B*	Drawing, Tube Bend
MIL-B-16246D(1)*	Bill of Materials, (For Ships and Ships Components)
MIL-B-19936*	Bills of Material: General Instructions for the Preparation Of
MIL-M-23127B*	Milestone/Cost Plan and Milestone Plan
MIL-D-23140B*	Drawing, Preliminary and Final, Electronic Equipment and Systems, Installation Control
MIL-D-24241*	Drawing, Sonar Systems Preliminary Installation Planning
MS-16662H*	General Notes for Standard Electrical Drawings
MIL-HDBK-223*	Coded List of Materials
MIL-BUL-543*	List of Standard Drawings

APPENDIX A

Non-Government Document No.	TITLE
ANSI/AWS A2.4-1979*	Symbols for Welding and Nondestructive Testing
ANSI/SAE AS 1290*	Graphic Symbols for Aircraft Hydraulic and Pneumatic Systems
ANSI B46.1-1978*	Surface Texture (Surface roughness, waviness and lay)
ANSI Y10.3-1968*	Letter Symbols for Quantities used in Mechanics of Solids
ANSI Y10.5-1968*	Letter Symbols for Quantities used in Electrical Science and Electrical Engineering
ANSI Y10.20-1975* (includes ANSI Y10. 20a-1975)	Mathematical Signs and Symbols for Use in Physical Sciences and Technology
ANSI Y14.1-1975	Drawing Sheet Size and Format
ANSI Y14.2M-1979*	Line Conventions and Lettering
ANSI Y14.3-1975*	Multi and Sectional View Drawings
ANSI Y14.5-1973	Dimensioning and Tolerancing
ANSI Y14.6-1978*	Screw Thread Representation
ANSI Y14.7.1-1971*	Gear Drawing Standards - Part 1 for Spur, Helical, Double Helical and Rack
ANSI Y14.7.2-1978*	Gear and Spline Drawing Standards - Part 2 Bevel and Hypoid Gears
ANSI Y14.15-1966*	Electrical and Electronics Diagrams
ANSI Y14.15a-1970*	Interconnection Diagrams
ANSI Y14.15b-1973*	Supplement to ANSI Y14.15-1966 and ANSI Y14.15a-1970
ANSI Y14.17-1966*	Fluid Power Diagrams

APPENDIX A

Non-Government Document No.	Title
ANSI Y14.26.3-1975*	Computer-Aided Preparation of Product Definition Data (Including Engineering Drawings), Terms and Definitions
ANSI Y14.36-1978*	Surface Texture Symbols
ANSI Y32.4-1977*	Graphic Symbols for Plumbing Fixtures for Diagrams Used in Architecture and Building Construction
ANSI Y32.9-1972*	Graphic Symbols for Electrical Wiring and Layout Diagrams Used in Architecture and Building Construction
ANSI Y32.10-1967*	Graphic Symbols for Fluid Power Diagrams
IEEE STD 91-1973	Graphic Symbols for Logic Diagrams (two-state devices) (Same as ANSI Y32.14-1973)
IEEE STD 200-1975*	Reference Designations for Electrical and Electronics Parts and Equipments
IEEE STD 260-1978*	Standard Letter Symbols for Units of Measurement (SI Units, Customary Inch-Pound Units, and Certain Ohter Units) (revision of ANSI Y10.19-1968)
IEEE STD 315-1975*	Graphic Symbols for Electrical and Electronics Diagrams (Including Reference Designation Class Designation Letters) (Same as ANSI Y32.2-1975)

Non-DODISS Document	Title
AD-1350	Engineering Drawings and Associated Lists
WR-12-1	Engineering Drawings, Associated Lists and Referenced therein.

APPENDIX B

DRPR DOCUMENTS TO BE CANCELLED

This appendix lists the DRPR Documents that will be cancelled.

Document No.	Title
MIL-STD-9A	Screw Thread Conventions and Methods of Specifying
MIL-D-1000/5A(1)	Drawings Procurement (Identical Items), for Electronics Command Equipment
MIL-D-1000/6	Drawings Procurement (Identical Items), for Electronics Command Test Fixtures
MIL-D-1000/7	Drawings Design Evaluation (Industry Standards), for Electronics Command Equipment
MIL-D-1000/8	Drawing Procurement (Identical Items), for Electronics Command Mechanical Gages and Gage Cases
MIL-D-1000/9(1)	Drawing, Procurement (Identical Items), (Industrial Standard), for Electronics Command Equipment
MIL-D-1000/10(1)	Drawings, Procurement (Interchangeable Items), for Electronics Command Parts
MIL-D-1000/11	Drawings, Installation (Industry Standard)

DATA REQUIREMENTS FOR CUSTOM LARGE SCALE INTEGRATION (LSI) AND CUSTOM HYBRID MICROCIRCUITS

by

Dr. Victor W. Ruwe
U. S. Army Missile Command
Dr. J. L. Davidson
Consultant to U. S. Army

SUMMARY

A specification document describing the necessary minimum data requirements from suppliers of Custom LSI and hybrid microcircuits to the government has been formulated and utilized. This specification facilitates necessary second sourcing and reduces the possibility of obsolescence impact.

INTRODUCTION - The sophistication of modern weapons systems requires an ever increasing intelligence of those systems which is secured through electronics. The stringent storage and development conditions, advancing countermeasures circumstances and unique mission objectives dictate in most instances that these electronic solutions be custom designed, miniaturized and utilize state-of-the-art large scale integration (LSI) and hybrid technology.

Without exception, the criticality of any major weapons program requires that, during development, sufficient data be documented and made available to the government such that two or more sources of the critical elements could be developed to assure supply and to promote cost optimization through competition. Furthermore, since it cannot be assured that a manufacturer will continue to build a component or stay in business for times that equal total program life, the issue of obsolescence avoidance must be addressed.

DATA REQUIREMENTS SPECIFICATION - The appendix to this paper is a self-explanatory specification that details the necessary data requirementsto completly define custom LSI or hybrid microcircuits such that it will be possible to assure second sourcing capability. This specification defines, by way of categorization, levels of criticality, visability and technical sophistication that provide the government and supplier of custom microelectronics a definitive framework within which required data can be identified and quantified. Further, within this framework, clear understandings regarding what data is required and available for government control and visability can be identified in the development phase of programs, eliminating insufficiencies later and better assuring secural of the fundamental objective, a continual, cost effective supply of essential microelectronic components for weapons systems.

Figures 5 through 9 are illustrative of the complexity and high technology content of these electronic systems. *Deriving a specification document* that adequately embodies all criteria to allow other sources to duplicate such equipment was no simple task. However, the specification that is the subject of this paper, when utilized in good faith between government and supplier can be successful.

The central concepts of the specification are:

1.) Establishing levels of categorization that define boundaries of accessibility and visability between government and supplier and

2.) Defining the various types of technically descriptive data that are germaine to Custom LSI and hybrids within those categories.

CATEGORIES OF DATA - As described in Section 3.1.1 of the attached specification, levels of technical data can be broken into four categories. Category I is the most stringent with respect to descriptiveimpact and control of change. These criteria, which describe the fundamental configurations and performance criteria of the system (see next section for further discussion), are considered essential to system performance objectives and cannot be changed in any manner without extensive evaluation by all parties.

Category II represents the next level of data criticality and is comprised of information that, if change was proposed, would require substantial justification that Category I criteria would not be impacted. Also, data in Category II, as is true for Category I and III, is considered essential to describing system requirements for establishing alternative sources.

Category III data is information that may be in the realm of confidentiality to the supplier. It is data necssary to assurealternate sourcing, but because it need not leave the contractor's facilities, the dual requirementsof government confirmation of existence and sufficiency and the contractor's privacy are satisfied.

Category IV data is typically detailed design or operating information that contractors develop at their own expense and relate to device construction parameters considered vendor proprietary. A description of such data is contained in M-S-38510.

DESCRIPTION OF DATA - Having defined levels of data categories, Sections 3.2 and 3.3 of the Data Requirments Specification describe the type of data for each category for LSI and hybrids. It is relevant to note certain distinctions between LSI technology and hybrid technology that impact Category IV. Specifically, because hybrid technology is generally recognized as a more established, less diverse, simpler, and slower changing collection of processes, there are not data embodiments that fit Category IV.

Looking at some examples of technical data in the respective categories (refer to 3.2 and 3.3 of the specification), Category I contains:

1.) Envelop Definition - embodies those form, fit and function parameters that describe specifically the mechanical and electronic operating performance of the system.

2.) Schematic and Block Diagram - Defines in electronic terminology the expected configuration and function of the system.

3.) Performance/Development Data - defines operation of the components and relates them to the application including all environmental and functional extremes.

4.) Test Specification - describes in detail how the components will be electrically tested to confirm their ability to meet system application.

Category II.

1.) Topology - information which defines in drawings and other medium the detailed dimensions or layouts of the microcircuits.

2.) Design Parameters - describes parameters of the elemental devices used in the circuits such that, for example, the circuit could be modeled, i.e. theoretically examined on a computer for performance adequacy.

3.) Packages, Parts List and Product Assurance - data that specifies the material components and the quality and reliability screening necessary to define the entire system.

Category III - Data that demonstrates that the contractor has sufficiently documented his manufacturing operation such that it can be expected that good control exists and that cost objectivesare reasonable.

Category IV - Detailed device construction data that maybe unique to an individual contractor, and considered proprietary. It is assumed that from sufficient documentation in Categories I, II and III, system objectives could be secured from

alternate sources while the contractor may protect certain detailed technical data, developed at contractor's expense, involving his competitive posture.

CONCLUSION - A framework within which the government may secure that data necessary to assure perpetual sources for critical weapons programs at minimum cost while simultaneously allowing contractorsto protect their proprietary data has been created via a specification which provides levels of categorization of necessary data.

By utilizing this approach in existing and future procurements, the essential objective of assured sources of microelectronic components for intelligent weapons can be better achieved.

INTRODUCTION

- Intelligent Weapons Systems
  - + Sophisticated and precise objectives
  - + Stringent storage and deployment conditions
  - + Increasing electronic content
- High Density Electronics
  - + Custom LSI ⎫ Function or configuration
  - + Custom Hybrid ⎭
- Development Cost Content
  - + Increasing part of total cost
  - + Cost avoidance through better data documentation

SECOND SOURCE REQUIREMENTS

- Supply assurance
- Cost optimization through competition

OBSOLESCENCE AVOIDANCE

- 10 and more years in weapons arsenal
- Spares and refurbishment
- Essentiality of alternate supply

INTELLIGENT WEAPONS SYSTEMS

- Copperhead laser guided artillery shell
  - + Multiple custom LSI and hybrid microelectronics
- TADS/PNVS Helicopter system
  - + More than 100 custom LSI and hybrid microcircuits

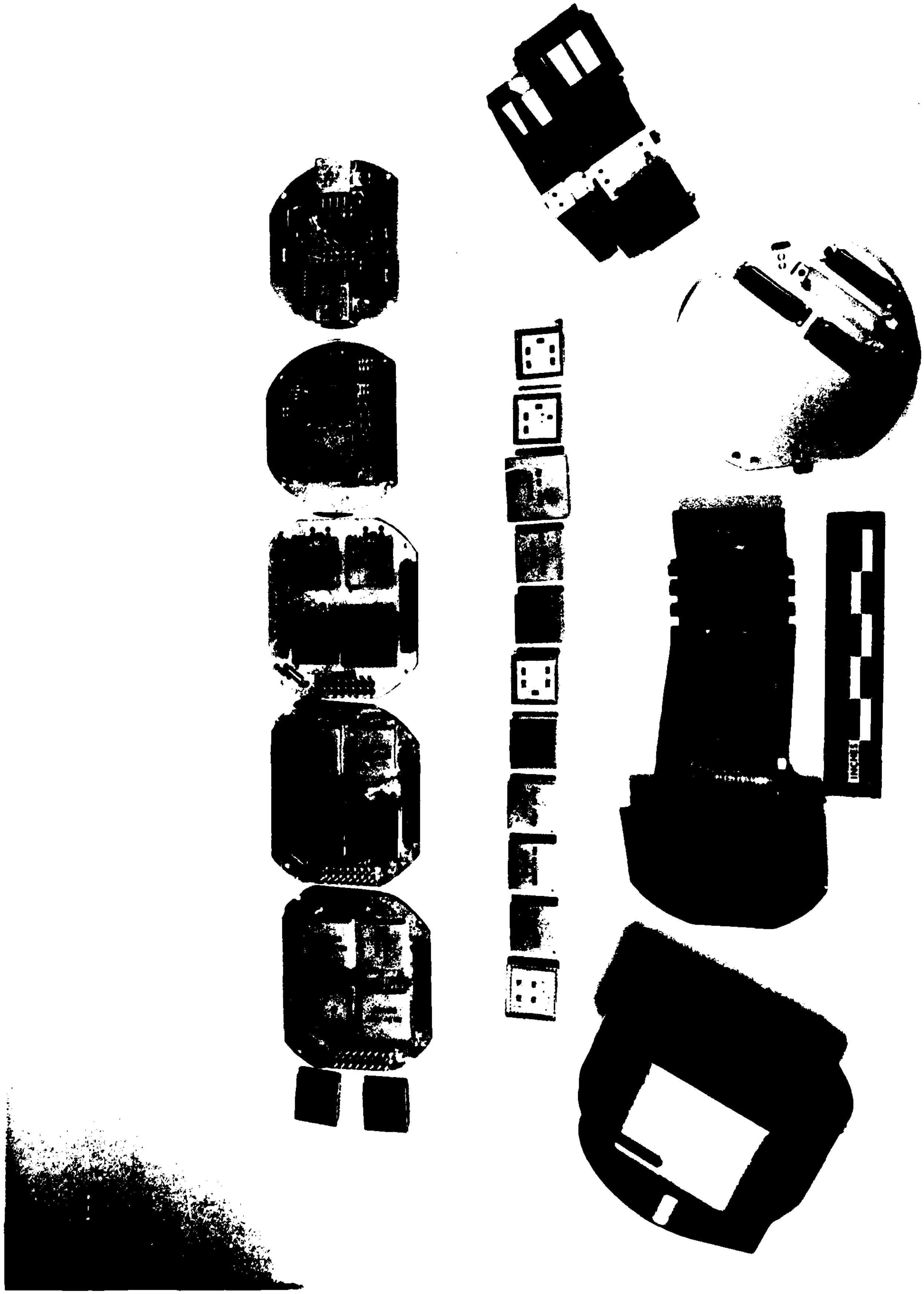


FIGURE 5
ELECTRONIC SYSTEM
UTILIZING MICROCIRCUITS

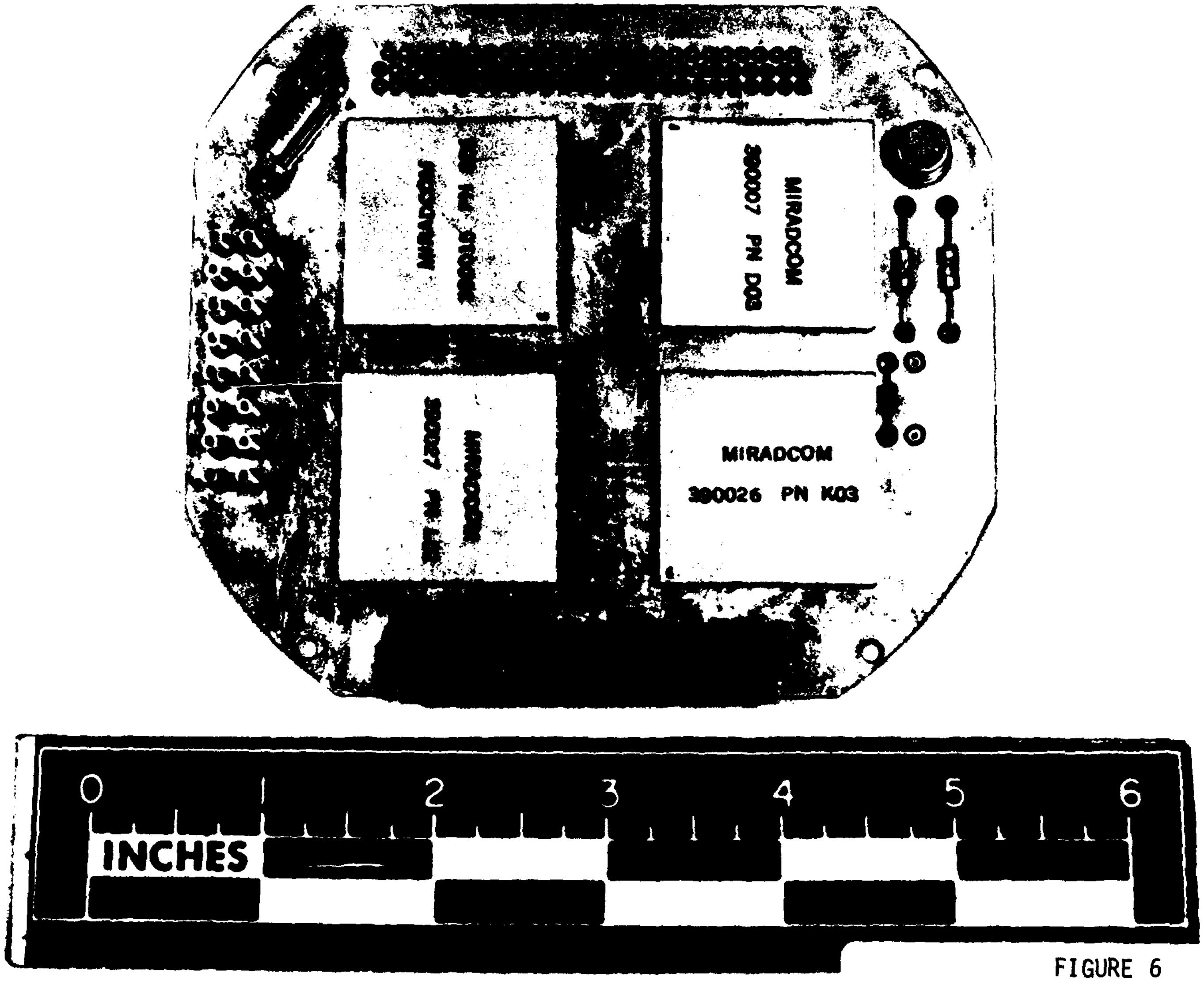


FIGURE 6
PACKAGED HYBRIDS ON BOARD

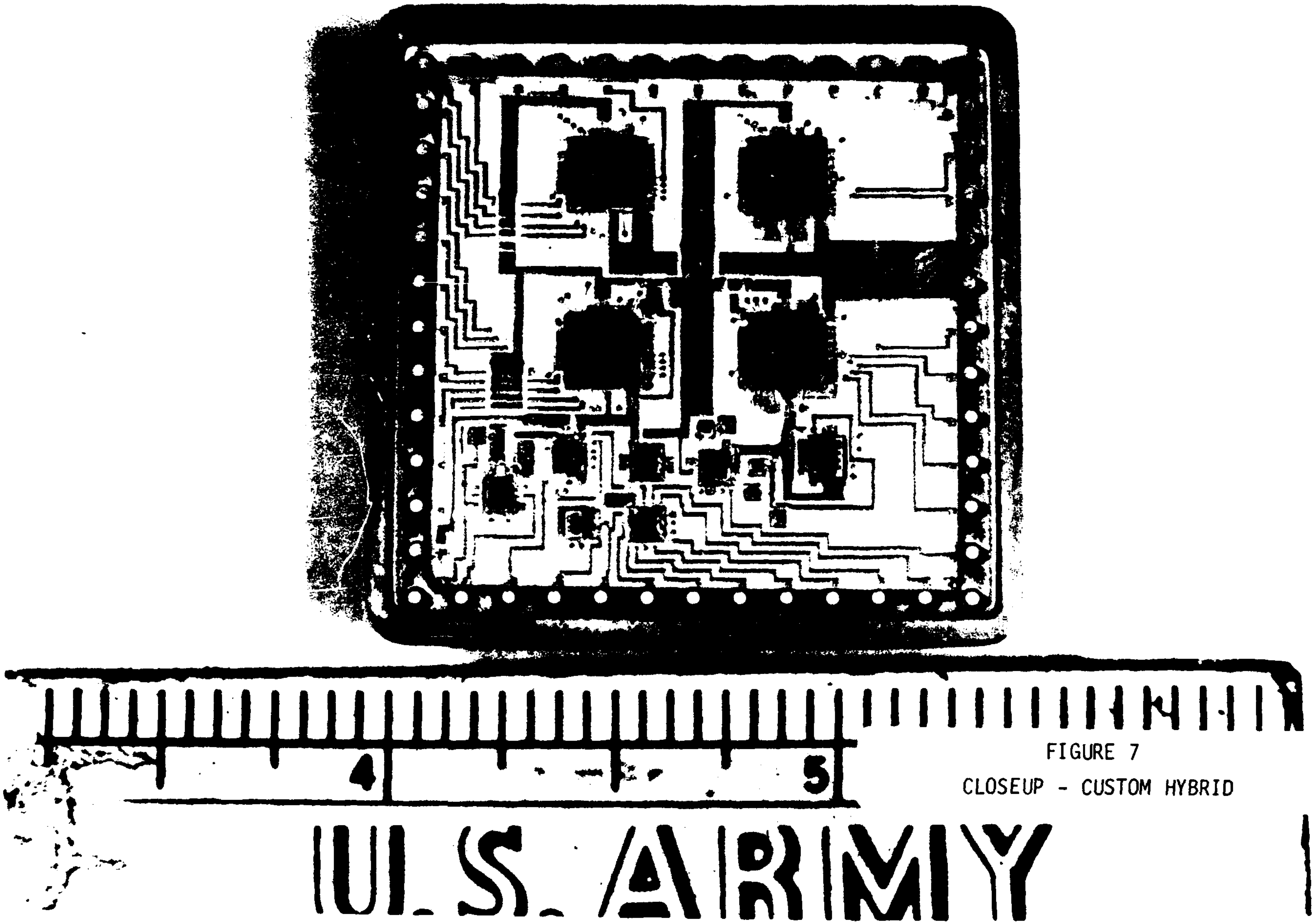


FIGURE 7

CLOSEUP - CUSTOM HYBRID

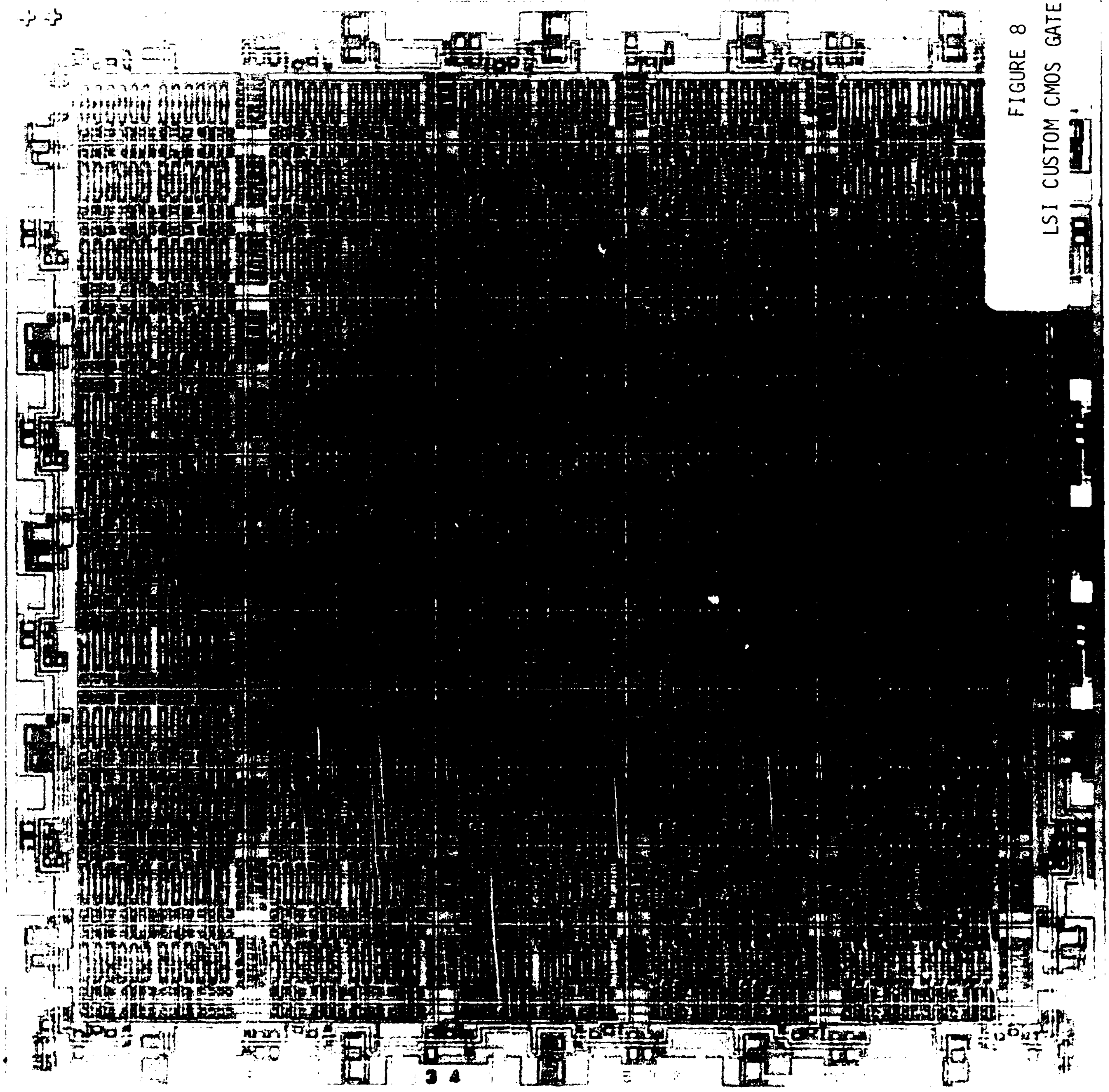


FIGURE 8
LSI CUSTOM CMOS GATE ARRAY

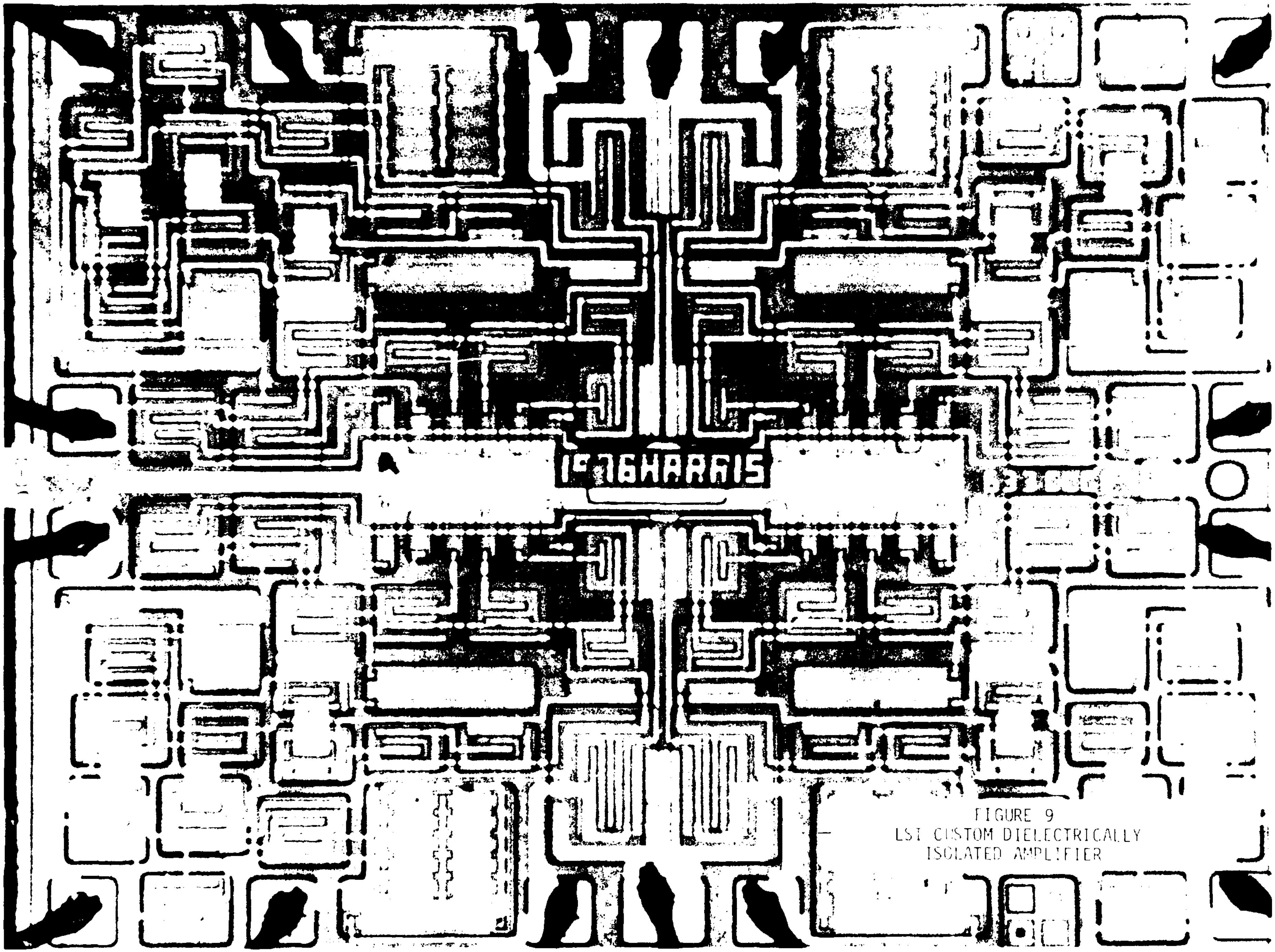


FIGURE 9
LSI CUSTOM DIELECTRICALLY
ISOLATED AMPLIFIER

DATA REQUIREMENTS - CATEGORIZATION

CATEGORIZING TYPE OF DATA AS TO:

1) NECESSITY FOR EXSISTENCE AND SUFFICENCY
2) LEVEL OF VISABILITY AND AVAILABILITY TO GOVERNMENT
3) TYPE OF TECHNICAL INFORMATION AND DOCUMENTATION

CATEGORY I - GOVERNMENT CONTROLS DATA. DATA IS UNDER ECP CONTROL

CATEGORY II - CONTRACTOR DATA AVAILABLE AND DELIVERABLE TO GOVERNMENT ON REQUEST

CATEGORY III - CONTRACT DATA AVAILABLE AT CONTRACTOR'S FACILITY FOR GOVERNMENT REVIEW

CATEGORY IV - CONTRACTOR PROPRIETARY DATA - NOT REQUIRED FOR GOVERNMENT REVIEW

DATA REQUIREMENTS

SPECIFICATION DESCRIBING NECESSARY MINIMUM DATA REQUIREMENTS FROM SUPPLIER TO FACILITATE SECOND SOURCING AND REDUCE OBSOLESCENCE IMPACT HAS BEEN FORMULATED AND UTILIZED

DATA REQUIREMENTS

FACTORS DISTINGUISHING LSI FROM HYBRIDS

- LSI
  - + PROCESS & PROCEDURES DIVERGENCE
  - + TECHNOLOGY NON-UNIFORMITY
  - + RAPIDLY CHANGING MANUFACTURING TECHNIQUES
- HYBRID
  - + PROCESS & PROCEDURE SIMILARITY
  - + LESS DESIGN COMPLEXITY
  - + MORE MATURE LESS DIVERGENT TECHNOLOGY

DATA REQUIREMENTS

SPECIFICATION OUTLINE

CATEGORY	LSI	HYBRIDS
I	1. ENVELOP DEFINITION DIMENSIONS, FORM FACTOR, MATERIALS 2. SCHEMATIC & BLOCK DIAGRAM I/O, POWER REQUIREMENTS . 3. PERFORMANCE/DEVELOPMENT DATA M-S-1331 4. TEST SPECIFICATION FIXTURES, EQUIPMENT, DETAILED PROGRAM	SAME
II	1. TOPOLOGY LAYOUTS, DIMENSIONS 2. DESIGN PARAMETERS DEVICE CHARACTERISTICS, MODELING 3. PACKAGES 4. PARTS LIST 5. PRODUCT ASSURANCE	SAME
III	1. MAJOR YIELDS 2. PROCESS FLOW 3. DESIGN GUIDELINES 4. COST MODEL	SAME
IV	1. PROCESS PARAMETERS DOPING, CONDITIONS, SHEETS	NOT APPLICABL

SUMMARY

A FRAMEWORK WITHIN WHICH THE GOVERNMENT MAY SECURE THAT DATA NECESSARY TO ASSURE PERPETUAL SOURCES FOR CRITICAL WEAPONS PROGRAMS AT MINIMUM COST WHILE SIMULTANEOUSLY ALLOWING CONTRACTORS TO PROTECT THEIR PROPRIETARY DATA HAS BEEN CREATED VIA A SPECIFICATION WHICH PROVIDES LEVELS OF CATEGORIZATION OF NECESSARY DATA.

BY UTILIZING THIS APPROACH IN EXISTING AND FUTURE PROCUREMENTS THE ESSENTIAL OBJECTIVE OF ASSURED SOURCES OF MICROELECTRONIC COMPONENTS FOR INTELLIGENT WEAPONS CAN BE BETTER ACHIEVED.

APPENDIX

DATA REQUIREMENTS

FOR

CUSTOM LARGE SCALE INTEGRATION (LSI)

AND

CUSTOM HYBRID MICROCIRCUITS

U.S. ARMY MICOM

DRDMI-EAT
Redstone Arsenal, AL 35809

21 August 1979

AD-A169 665 PROCEEDINGS OF THE ANNUAL MEETING OF THE TECHNICAL DOCUMENTATION DIVISION..(U) AMERICAN DEFENSE PREPAREDNESS ASSOCIATION WASHINGTON DC MAY 80 2/4

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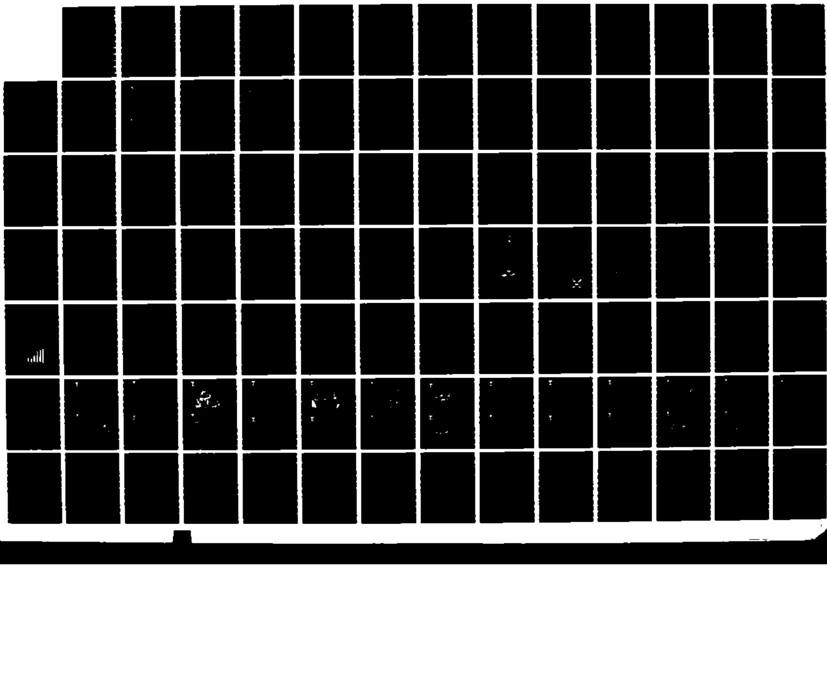
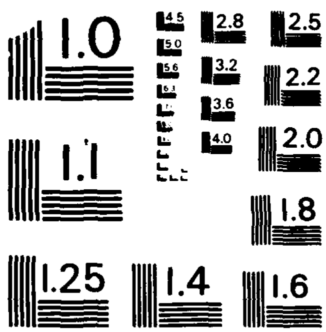




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

DATA REQUIREMENTS FOR

CUSTOM LARGE SCALE INTEGRATION (LSI) AND

CUSTOM HYBRID MICROCIRCUITS

1. SCOPE

1.1 General. This document establishes the design information and data required for custom large scale integration (LSI) and custom hybrid microcircuits which are to be delivered to MICOM or otherwise maintained by the developing agency or organization.

1.2 Type. Custom LSI and custom hybrid microcircuits covered in this document include monolithic, multichip, thick-film and thin-film devices.

1.3 Classification. Custom LSI and custom hybrid microcircuits covered in this document shall conform to the requirements of MIL-M-38510, Classes S, B, or C.

2. APPLICABLE DOCUMENTS

The following specification and standards form a part of this document to the extent referenced hereih. Unless otherwise indicated, the issue in effect on the date of invitation for bids or request for proposals shall apply.

Specifications:

Dod-D-1000	Drawings, Engineering and Associated Lists
MIL-M-38510	Microcircuits, General Specification for
MIL-M-55565	Microcircuits, Packaging of

Standards:

DoD-STD-100	Engineering Drawing Practices
MIL-STD-883	Test Methods and Procedures for Microelectronics
MIL-STD-1331	Parameters to be Controlled for the Specification of Microcircuits

3. REQUIREMENTS

3.1 General. The data for each custom LSI and custom hybrid microcircuit covered by this document shall be sufficient to completely depict the specific package, electrical, environmental, and quality assurance requirements to which they are designed, fabricated, tested, screened

and qualified. The technological differences between custom LSI and custom hybrids require that each be treated in separate sections of this document. Data required for both custom LSI and custom hybrids shall be grouped according to the categories outlined below.

3.1.1 Categories. Data for both custom LSI and custom hybrid microcircuits shall be divided into four discrete data classifications. These classifications shall be referred to as categories I, II, III, and IV. Each category shall contain a certain level of technical information and specific documentation requirements.

3.1.1.1 Category I. Data in category I shall come under Engineering Change Procedure (ECP) Control at acceptance of the Technical Data Package (TDP) and shall conform to the requirements specified in DoD-D-1000 and DoD-STD-100.

3.1.1.2 Category II. Data in Category II shall be deliverable upon request or at the conclusion of the contract and shall be provided in the contractors usual format and be reproducible by conventional means.

3.1.1.3 Category III. Data in Category III shall be available at contractor's facility or at the facility of his subcontractor(s) or vendor(s) and shall be available for procuring activity review during the contractual period.

3.1.1.4 Category IV. Data in category IV shall be design, process or manufacturing procedures and specifications which have been developed solely at contract's expense and which the contractor has no obligation to provide or otherwise submit for review to the procuring agency.

3.1.2 Notification. It shall be the responsibility of the contractor, his subcontractors and vendors to notify the procuring agency of any changes during the contractural period to category II,III or IV data which affects cost, reliability or performance of the procured item.

3.2 Custom LSI Data

3.2.1 Category I.

3.2.1.1 Envelop Definition. Data provided in the technical data package shall be sufficient to control exterior dimensions, form factor, weight, pin functions and configurations and exterior materials and surfaces. The data shall further include a comprehensive description of the functional operation and intended usage of each custom LSI microcircuit. Any peculiar or subtle features or characteristics shall be specifically detailed.

3.2.1.2 Schematic and Block Diagram. Data shall include a detailed schematic illustrating all inputs, outputs, power requirements, grounds shields, device identifications, functional areas and signal paths. Repetitive circuits may be shown as block diagrams provided a schematic is supplied of the repeated structure or cell.

3.2.1.3 Performance/Development Data. The electrical performance characteristics necessary to define the operation of each custom LSI microcircuit when it is used in its intended application and through the intended environments shall be listed and described in detail. These characteristics as defined in MIL-STD-1331 typically include, but are not limited to, transfer function, input pulse characteristics, source impedance, pulse rate, pulse delay, output pulse characteristics, load impedance, band width and noise immunity. The absolutemaximum ratings for these characteristics shall be defined at room ambient, minimum and maximum operating temperatures.

3.2.1.4 Test Specification. Data shall include a complete and detailed test specification for each custom LSI microcircuit sufficient for procurement. The test specification shall include a test fixture drawing, identification of test equipment by manufacturer and model number, a step-by-step procedure supplemented by figures depicting appropriate inputs, outputs, intermediary waveforms, and timing diagrams.

3.2.2 Category II.

3.2.2.1 Topology. Magnetic tapes, photographs, transparencies or diazotypes of the mask of each oxide or metal layer at a minimum magnification of 50X shall be supplied. The top metallization mask shall describe the terminal interconnect pattern. Information contained shall be dimensionallly accurate. Changes occurring prior to delivery shall be documented.

3.2.2.2 Design Parameters. Data shall include device parameters covering diffused, implanted, or otherwise elemental structures keyed to the circuit diagram and in sufficient detail to be transformed into models suitable for use in a simulation program such as ISPICE.

3.2.2.3 Packages. Package data shall include type, manufacturer, manufacturer part number, dimensions, plating, lead material and plating, and pinout configuration.

3.2.2.4 Parts List. Data shall include a complete parts list detailing part identification, description, manufacturer, manufacturer's part number, tolerances and dimensions.

3.2.2.5 Product Assurance. Design qualification and screening data gathered to assure the manufacture and delivery of hardware in accordance with paragraph 3.4 of MIL-M-38510, classes S,B or C, as applicable, shall be supplied.

3.2.3 Category III. Data contained in this category shall include yield at major process steps, process flow plans, travelers, quality control plans, design guidelines and cost driver information including time and motion evaluations.

3.2.4 Category IV. Data contained in this category is interpreted to include process sheets, doping levels, doping profiles, diffusion parameters and ion implant parameters.

3.3 Custom Hybrid Data.

3.3.1 Category I.

3.3.1.1 Envelop Definition. Data provided in the technical data package shall be sufficient to control exterior dimensions, form factor, weight, pin functions and configurations and exterior materials and surfaces. The data shall further include a comprehensive description of the functional operation and intended usage of each custom hybrid microcircuit. Any peculiar or subtle features or characteristics shall be specifically detailed.

3.3.1.2 Schematic and Block Diagram. Data shall include a detailed schematic illustrating all inputs, outputs, power requirements, grounds, shields, device identifications, functional areas and signal paths. Repetitive circuits may be shown as block diagrams provided a schematic is supplied of the repeated structure or cell.

3.3.1.3 Performance/Development Data. The electrical performance characteristics necessary to define the operation of each custom hybrid microcircuit when it is used in its intended application and through the intended environments shall be listed and described in detail. These characteristics as defined in MIL-STD-1331 typically include, but are not limited to, transfer function, input pulse characteristics, source impedance, pulse rate, pulse delay, output pulse characteristics, load impedance, bandwidth and noise immunity. The absolute maximum for these characteristics shall be defined to room ambient, minimum and maximum operating temperatures.

3.3.1.4 Test Specification. Data shall include a complete and detailed test specification for each custom hybrid microcircuit sufficient for procurement. The test specification shall include a test fixture drawing, identification of test equipment by manufacturer and model number, a step-by-step procedure supplemented by figures depicting appropriate inputs, outputs, intermediary waveforms, and timing diagrams.

3.3.2 Category II.

3.3.2.1 Topology. Magnetic tapes, photographs, transparencies or diazotypes of the mask of each dielectric or metal layer at a minimum magnification of 10X shall be supplied. The metallization mask or screen shall describe the terminal interconnect pattern. Information contained shall be dimensionally accurate. Changes occurring prior to delivery shall be documented.

3.3.2.2 Design Parameters. Data shall include a substrate and assembly specification detailing the critical parameters necessary to fabricate the custom hybrid microcircuit.

3.3.2.3 Packages. Package data shall include type, manufacturer, manufacturer part number, dimensions, plating, lead material and plating, and pin-out configuration.

3.3.2.4 Parts List. Data shall include a complete parts list detailing part identification, description, manufacturer, manufacturer's part number, tolerances, power dissipation and dimensions.

3.3.2.5 Product Assurance. Design qualification and screening data gathered to assure the manufacture and delivery of hardware in accordance with paragraph 3.4 of MIL-M-38510, classes S, B or C, as applicable, shall be supplied.

3.3.3 Category III. Data contained in this category shall include yield at major process steps, process flow plans, travelers, quality control plans, design guidelines, cost driver information including time and motion evaluations, screening and firing parameters, deposition parameters and non-standard material modifications.

3.3.4 Category IV. Does not apply.

SESSION 2

Workshop Coordinator

MRS. LORNA BURNS
Hughes Aircraft Company

See sections P, Q, and R for Session 2 workshop summaries.

SESSION 3

Chairman: MR. CHARLES W. GEDNEY
Research Analysis and
Management Corporation

Secretary: MR. CHARLES D. FISHER
RCA, Government Communications
Systems Division

INTERNATIONAL TECHNOLOGY TRANSFER
AND CONFIGURATION MANAGEMENT
BY

REUBEN E. DUNLAP
US ARMY MISSILE COMMAND

INTRODUCTION - TODAY, THERE IS A GREAT DEAL OF HIGH LEVEL INTEREST IN THE SUBJECT OF TECHNOLOGY TRANSFER. MUCH OF THIS RECENT INTEREST HAS BEEN PROMPTED BY THE DESIRE TO USE THE TECHNOLOGY TRANSFERRED TO A DEVELOPING COUNTRY AS A STIMULANT TO INCREASE THE PACE OF THAT COUNTRY'S DEVELOPMENT. HOWEVER, THIS EFFORT, WHICH IS COMPARATIVELY SMALL, IS CURRENTLY OVERSHADOWED BY THE TREMENDOUS AMOUNT OF TECHNOLOGY THAT IS TRANSFERRED BETWEEN DEVELOPED NATIONS. UNTIL THE MID 1960'S, MUCH OF THIS TRANSFER HAS BEEN FROM THE UNITED STATES TO COUNTRIES IN WESTERN EUROPE. HOWEVER, IN RECENT YEARS THE UNITED STATES HAS BECOME AN IMPORTER OF TECHNOLOGY IN MANY INDUSTRIES. IN THE PAST, ATTEMPTS AT TRANSFERRING THE TECHNOLOGY OF A MAJOR WEAPON SYSTEM TO THIS COUNTRY HAD NOT BEEN SUCCESSFULLY ACCOMPLISHED AS THESE PROGRAMS HAVE BEEN BESET WITH PROBLEMS. HOWEVER, TRANSFER OF THE ROLAND AIR DEFENSE SYSTEM TECHNOLOGY FROM FRANCE AND GERMANY IS A NOTEABLE EXCEPTION ON BOTH COUNTS, THE MAGNITUDE OF THE SYSTEM AND SUCCESS OF THE TECHNOLOGY TRANSFER EFFORT. THIS DISCUSSION WILL PROVIDE A BACKGROUND RELATIVE TO THE ROLAND TECHNOLOGY TRANSFER EFFORT, THE APPROACH USED IN THE DATA TRANSFER, IMPACT OF METRICATION AND EUROPEAN DRAWING PRACTICES, AND THE STEPS TAKEN TO AVOID "AMERICANIZATION" OF ROLAND. IT WILL ALSO OUTLINE THE EFFORTS TO STANDARDIZE EUROPEAN AND US ROLAND PARTS, MATERIALS AND PROCESSES, AND THE PROCESS FOLLOWED TO MAXIMIZE INTERCHANGEABILITY OF HARDWARE BETWEEN THE EUROPEAN AND US SYSTEMS.

BACKGROUND - IN JUNE 1970, DEPUTY SECRETARY OF DEFENSE DAVID PACKARD ISSUED A MEMORANDUM TO THE SECRETARIES OF THE ARMY, NAVY, AND AIR FORCE, ENTITLED, "COOPERATIVE ARMAMENTS FOR EUROPE." THIS MEMORANDUM EMPHASIZED THE DOD POLICY ON COOPERATION WITH ALLIES IN RESEARCH AND DEVELOPMENT. THE FOLLOWING EXCERPT FROM THE PACKARD MEMORANDUM ESTABLISHED THE GROUNDWORK FOR THE EVENTS THAT FOLLOWED: "...AT THE PRESENT TIME THE INDUSTRIAL COUNTRIES OF EUROPE CAN POINT TO ADVANCES IN TECHNOLOGY WHICH ARE EQUAL TO OR EXCEED THOSE OF THE US. MUCH OF THIS ADVANCED TECHNOLOGY HAS RESULTED FROM THE REALIZATION THAT THEY CANNOT CONTINUE TO DEPEND ON THE US FOR TECHNOLOGICAL SUPPORT. THE DEVELOPMENT COST OF A MAJOR WEAPON SYSTEM IN TODAY'S ECONOMY IS BEYOND THE CAPABILITY OF MOST NATIONS, AND THEREFORE THEY ARE FOUND TO POOL TECHNICAL AND FISCAL RESOURCES IN THE RESEARCH, DEVELOPMENT, AND PRODUCTION OF MANY WEAPONS AND WEAPON SYSTEMS.

CONSIDERING THE SIGNIFICANT INCREASE IN EUROPEAN CAPABILITY, THE DESIRABILITY OF STANDARDIZATION OF WEAPON SYSTEMS, AND THE LIMITATION OF US FUNDS, I CONSIDER IT DESIRABLE TO RE-EMPHASIZE OUR POLICY TO COOPERATE WITH OUR EUROPEAN ALLIES TO THE EXTENT THAT EUROPEAN TECHNOLOGY CAN BE USED, STANDARDIZATION OF WEAPONS AND SYSTEMS CAN BE ACHIEVED AND COST REDUCED ..."

IN KEEPING WITH THIS POLICY THREE EUROPEAN SHORT RANGE AIR DEFENSE (SHORAD) SYSTEMS WERE EVALUATED OVER A THREE YEAR PERIOD BEGINNING IN 1970 TO DETERMINE IF THEY COULD SATISFY THE US SHORT RANGE AIR DEFENSE REQUIREMENTS. THESE SYSTEMS WERE THE BRITISH RAPIER, FRENCH CROTALE, AND THE FRANCO-GERMAN ROLAND. THE RESULTS OF THESE EVALUATIONS DETERMINED THAT ALL SYSTEMS CAME CLOSE TO MEETING THE US ARMY REQUIREMENTS, AND EACH WAS SUFFICIENTLY BALANCED IN MILITARY ASPECTS AND ENGAGEMENT PERFORMANCE TO JUSTIFY CONTINUED ACTIVE US INTEREST.

IN JULY 1974, PROPOSALS FOR AN ALL WEATHER SHORAD SYSTEM WERE SOLICITED FROM 21 SOURCES. IN RESPONSE TO THIS SOLICITATION, PROPOSALS WERE RECEIVED FROM HUGHES AIRCRAFT COMPANY (ROLAND), PHILCO-FORD (AW CHAPARRAL), ROCKWELL INTERNATIONAL (CROTALE), AND UNITED AIRCRAFT (RAPIER/BLINDFIRE). IN JANUARY 1975, A CONTRACT WAS AWARDED TO HUGHES AIRCRAFT COMPANY FOR ROLAND, A SYSTEM JOINTLY DEVELOPED BY FRANCE AND GERMANY.

FROM THE BEGINNING OF THE PROGRAM, A NEED WAS RECOGNIZED TO DUPLICATE THE EUROPEAN DESIGN AS EXACT AS POSSIBLE AND AVOID "AMERICANIZATION" OF THE SYSTEM, AN ACT WHICH HAD PLAGUED PREVIOUS ATTEMPTS TO TRANSFER WEAPON TECHNOLOGY FROM EUROPE. THESE ATTEMPTS HISTORICALLY RESULTED IN US REDESIGN OF THE EUROPEAN SYSTEM TO SUCH AS EXTENT THAT VERY LITTLE SIMILARITY EXISTED BETWEEN THE FINAL VERSIONS OF THE SYSTEM. THIS PROCESS OF "AMERICANIZATION" DEFEATS THE ORIGINAL OBJECTIVE OF SELECTING A FOREIGN DESIGN, THAT IS TO PRECLUDE EXTENSIVE RESEARCH AND DEVELOPMENT EFFORTS AND MINIMIZE THE TIME TO SYSTEM DEPLOYMENT. SUFFICIENT ROLAND FIRE UNITS AND MISSILES HAVE BEEN BUILT AND TESTED TO DEMONSTRATE PERFORMANCE AND INSURE THE TECHNOLOGY HAS BEEN SUCCESSFULLY TRANSFERRED.

BASED ON THE EXPERIENCE OF OTHER EUROPEAN TO US TECHNOLOGY TRANSFER PROGRAMS, THE US ROLAND PROJECT OFFICE HAS TAKEN STEPS TO PRECLUDE THE "AMERICANIZATION" OF ROLAND. IN THIS REGARD, THERE HAS BEEN A MINIMUM NUMBER OF CHANGES TO THE SYSTEM, ALL OF WHICH WERE MANDATORY AND REQUIRED TO MEET MINIMUM US REQUIREMENTS IN THE AREAS OF ECCM, SAFETY, AND PERFORMANCE.

<u>DESIGN COMMONALITY</u> - EARLY IN THE PROGRAM IT WAS RECOGNIZED THAT A FORUM WAS NEEDED FOR IDENTIFYING, RESOLVING, AND MINIMIZING REQUIREMENTS AND DESIGN DIFFERENCES BETWEEN

THE US AND EUROPEAN ROLAND. TO FULFILL THIS NEED A HIGH LEVEL US/EUROPEAN JOINT ROLAND CONTROL COMMITTEE (JRCC) WAS ESTABLISHED. THE JRCC HAD AS PART OF ITS STRUCTURE SEVERAL SUBCOMMITTEES ONE OF WHICH IS THE GOVERNMENT CONFIGURATION CONTROL BOARD (GCCB). THE OBJECTIVE OF THE GCCB IS TO ESTABLISH AN OPTIMUM LEVEL OF INTERCHANGEABILITY BETWEEN THE US AND EUROPEAN ROLAND SYSTEMS, PROVIDE MECHANISMS FOR MAINTAINING THIS LEVEL OF INTERCHANGEABILITY AND MAXIMIZE STANDARDIZATION OF HARDWARE BETWEEN BOTH SYSTEMS. NATIONAL ITEMS SUCH AS VEHICLES, COMMUNICATION EQUIPMENT ENVIRONMENTAL CONTROL UNITS, POWER UNITS AND IFF ARE NOT INCLUDED IN THESE INTERCHANGEABILITY CONSIDERATIONS.

ONE OF THE FIRST TASKS FACING THE GCCB WAS TO IDENTIFY AND RESOLVE REQUIREMENTS AND DESIGN DIFFERENCES. SEVERAL DIFFERENCES HAVE BEEN IDENTIFIED TO DATE, WITH THE OTHERS BEING RESOLVED BY ESTABLISHING A COMMON REQUIREMENT OR DESIGN. FOR EXAMPLE, EUROPEAN ROLAND IS POWERED BY A 50 HZ PRIMARY POWER UNIT AS OPPOSED TO A 400 HZ UNIT ORIGINALLY REQUIRED FOR US ROLAND. IF US ROLAND HAD RETAINED THE 400 HZ UNIT SEVERAL SYSTEM HARDWARE ITEMS, SUCH AS FAN MOTORS AND TIMING DEVICES, WOULD REQUIRE CHANGE DUE TO FREQUENCY DIFFERENCES. TO PRECLUDE THESE CHANGES, THE US ROLAND PRIMARY POWER REQUIREMENT WAS REVISED TO 50 HZ TO BE COMPATIBLE WITH THE EUROPEAN SYSTEM.

<u>STANDARDIZATION AND INTERCHANGEABILITY</u> - THE US ROLAND PROGRAM IS NOW REALIZING MAXIMUM BENEFIT OF STANDARDIZING HARDWARE WITH OUR EUROPEAN ALLIES. FOR EXAMPLE, THE ROLAND MISSILE IS COMPLETELY INTERCHANGEABLE BETWEEN THE THREE COUNTRIES INVOLVED. THIS INTERCHANGEABILITY HAS ENABLED THE FRENCH AND GERMANS TO FIRE A

US missile from a European Fire Unit and vice versa. To further illustrate the degree of system hardware interchangeability, 556 out of 584, or 96% of Field Replaceable Units (FRU) in the transferred European design are interchangeable.

This is not to say that maximizing interchangeability and standardization of hardware between the systems has been easy, it has not. Recognizing that a firmly established parts, materials, and process selection strategy was essential to the successful transfer of the European ROLAND technology, strict controls were placed on the selection approach. For example, each part (nuts, bolts, screws, electronic components) was screened to determine if an exact equivalent US part could be found. If an exact US part could not be found, then a near equivalent part would be selected, however this selection had to be approved by the US ROLAND Project Office on a case-by-case basis. The near equivalent parts have all the required properties of their European counterparts, but in some way are not identical. For example, a US capacitor may have the same electrical properties but be slightly larger or some material used is slightly harder or possesses a slightly different finish than its European counterpart.

Technical Data Transfer - To insure the successful transfer of ROLAND technical data, strict procedures were established for data receipt, control, translation, and conversion activities. The shear volume of data coupled with the lack of timely data delivery from Europe caused some initial transfer problems as its receipt was not always coincident with required program dates. To insure a smooth document flow, a central focal point was established by the contractor to receipt and record all incoming data. The more complex documents requiring translation were sent to a

SPECIALITY COMPANY WHICH PROVIDED DOCUMENT TRANSLATION SERVICES. TO ENHANCE THE TRANSFER PROCESS, EUROPEAN METRIC DIMENSIONS AND FIRST ANGLE PROJECTIONS WERE RETAINED ON THE DRAWINGS WITH ONLY THE NOTES BEING TRANSLATED. EUROPEAN DRAWING LINE WORK WAS PHOTOGRAPHICALLY TRANSFERRED TO A WASHABLE MYLAR MASTER AND THE TRANSLATED ENGLISH NOTES ADDED. IN ADDITION, EACH US DRAWING REFERENCED ITS EUROPEAN COUNTERPART TO PROVIDE TRACEABILITY BETWEEN THE TWO DRAWINGS. PRIOR TO FINAL CONVERSION, EACH DRAWING WAS REVIEWED BY THE RESPONSIBLE ENGINEER TO DETERMINE IF ALL DRAWING ELEMENTS AND/OR REQUIREMENTS WERE CLEAR AND UNDERSTANDABLE. IF QUESTIONS EXISTED, CONTACT WAS MADE WITH EUROPEAN COUNTERPARTS AND THE NECESSARY CLARIFICATION OBTAINED.

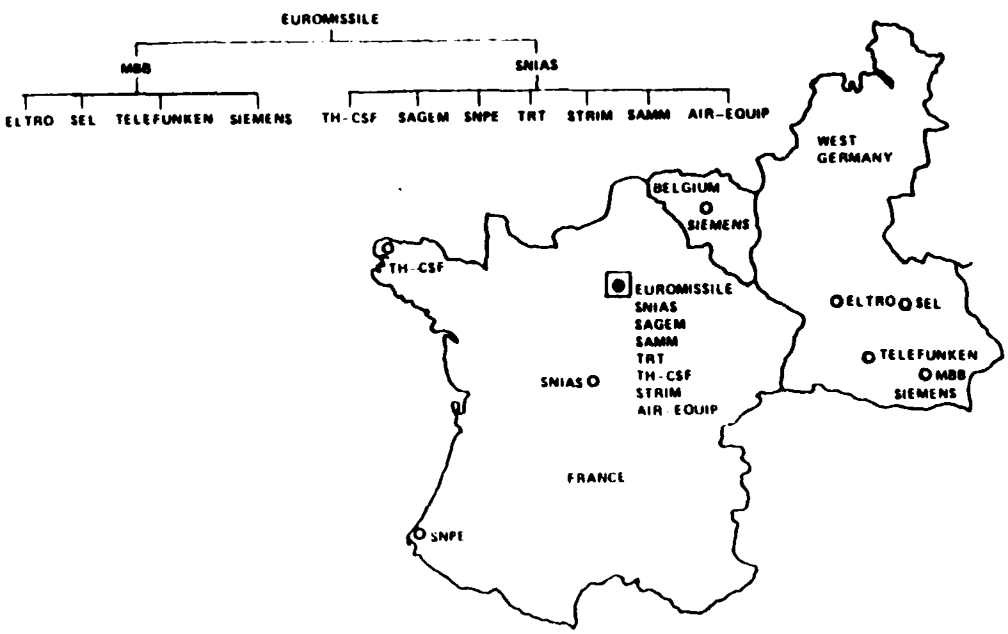
SUMMARY - TO DATE, APPROXIMATELY 40,000 EUROPEAN DRAWINGS AND SPECIFICATIONS HAVE BEEN CONVERRED. APPRXIMATELY 90,000 ADDITIONAL EUROPEAN DOCUMENTS HAVE BEEN RECEIVED AND PROCESSED. THESE ADDITIONAL DOCUMENTS INCLUDE CATALOGS, TOOLING, AND PRODUCTION SUPPORT EQUIPMENT DRAWINGS AND REPORTS WHICH ARE NOT A PART OF THE SYSTEM TECHNICAL DATA PACKAGE (TDP). THE USE OF METRIC DIMENSIONS AND EUROPEAN DRAWING CONVENTIONS HAVE NOT CAUSED A PROBLEM IN EITHER THE MANUFACTURE OR PURCHASE OF ROLAND HARDWARE. BASED ON PAST EXPERIENCE, THERE HAS BEEN A LOWER HARDWARE REJECTION RATE THAN ON A CONVENTIONAL DOMESTIC PROGRAM DUE TO THE CARE BEING EXERCISED BY PERSONNEL IN THE AREAS OF MANUFACTURING AND PURCHASING. AS AN EXAMPLE, IN THE SURVEILLANCE RADAR AREA, ONLY ONE PART, A CASTING, HAS BEEN REJECTED DUE TO MISINTERPRETATION OF A DRAWING BASED UPON THE EUROPEAN DESIGN. IN VIEW OF THE STRONG PROBABILITY THAT US INDUSTRY WOULD EVENTUALLY CONVERT TO THE INTERNATIONAL SYSTEM OF UNITS, OR METRICS, IT WAS DECIDED EARLY IN THE US ROLAND PROGRAM THAT THE USE OF METRICS, WITHOUT CONVERSION, WAS THE MOST ADVANTAGEOUS POLICY TO PURSUE.

In summary, the European ROLAND design is not being "Americanized" as evidenced by the high percentage of exact equivalent piece parts and interchangeable Field Replaceable Units. ROLAND is establishing a standard for future cooperative efforts between the US and its European allies in areas of cooperative arms acquisition to meet air defense needs.

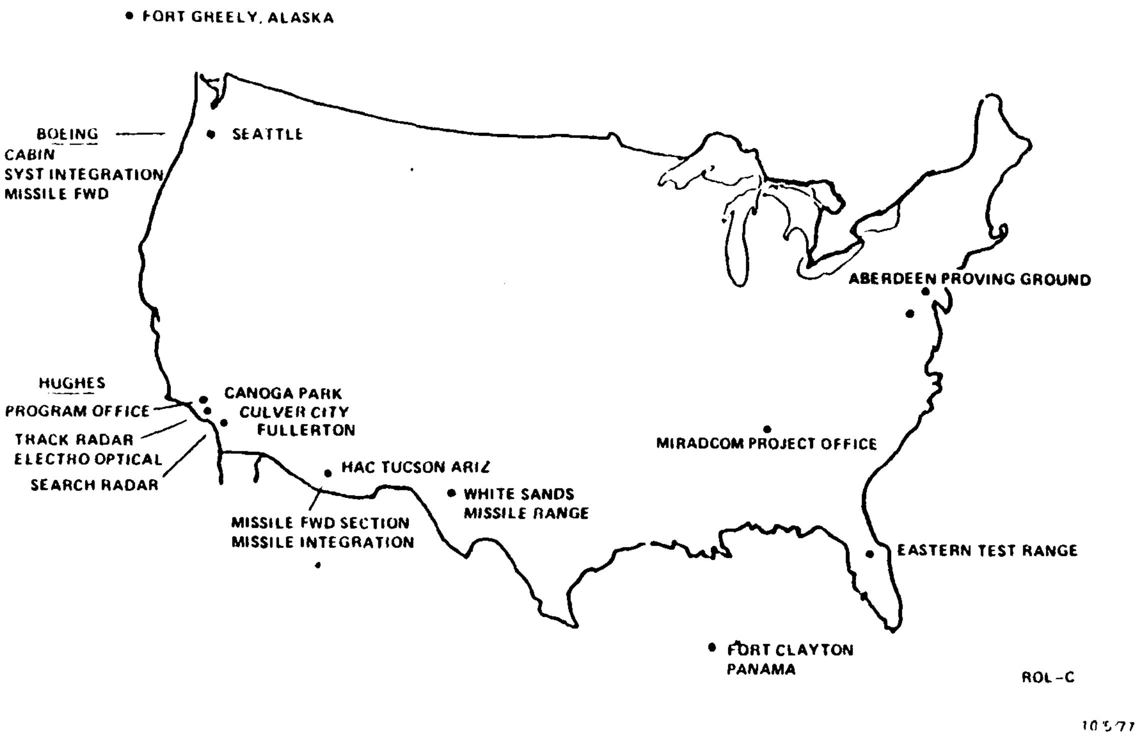
INTERNATIONAL TECHNOLOGY TRANSFER AND CONFIGURATION MANAGEMENT

PRESENTED BY:
REUBEN E. DUNLAP
RSI MGT OFF.
MICOM

MAJOR EUROPEAN CONTRACTORS



MAJOR US CONTRACTORS/ACTIVITIES GEOGRAPHIC LOCATIONS



OUTLINE

- BACKGROUND AND INTRODUCTION
- TECHNOLOGY TRANSFER APPROACH
- MAINTENANCE OF A COMMON US/EUROPEAN DESIGN
- INTERNATIONAL INTERCHANGEABILITY MANAGEMENT
- SUMMARY

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SUMMARY

- TECHNOLOGY TRANSFER SUCCESSFULLY COMPLETED

  $\geqslant$ 130,000 DOCUMENTS TRANSFERRED
  $\geqslant$ 4.2 MILLION TECHNICAL DOCUMENT WORDS TRANSLATED
  $\geqslant$ 90% EXACT EQUIVALENT PARTS
  $\geqslant$ 92% EXACT EQUIVALENT MATERIALS AND PROCESSES
  – FIRST ANGLE PROJECTION AND METRIC DRAWING USE SUCCESSFULLY DEMONSTRATED

- I^2 LIST APPROVED BY JRCC MAR 79 – CONTAINS 566 ITEMS
- MISSILE/FIRE UNIT I^2 INTERFACE SPECIFICATION APPROVED BY JRCC – JULY 79
- JRCC APPROVED EARLY 80 ACTIVATION OF JOINT GOVERNMENT CONTROL BOARD
- I^2 VERIFICATION PLAN IS EXPECTED TO BE ADOPTED DURING 1980
- JRCC APPROVED ROLAND GROWTH COMMITTEE

LESSONS LEARNED

- OBTAIN ENOUGH DATA INITIALLY TO UNDERSTAND COMPLEXITY OF TECHNICAL DATA TRANSFER
- PROPOSALS SHOULD ADEQUATELY ADDRESS COST AND SCHEDULE TO COMPLETE TRANSFER
- PROGRAM INTERFACES MUST BE ESTABLISHED EARLY TO ALLOW TECHNOLOGY TO BE TRANSFERRED IN ORDERLY MANNER
- SYSTEMS DESIGN STABILITY MUST BE REALISTICALLY ASSESSED AND UNDERSTOOD
- ORGANIZATION MUST BE ESTABLISHED TO REQUIRE CLOSE COORDINATION WITH US AND FOREIGN CONTRACTOR AND GOVERNMENT ORGANIZATIONS
- PM MUST MAKE FREQUENT PERSONAL VISITS TO HIGH LEVEL US AND EUROPEAN GOVERNMENT AND CONTRACTOR PERSONNEL

DEFINITION OF INTERNATIONAL INTERCHANGEABILITY

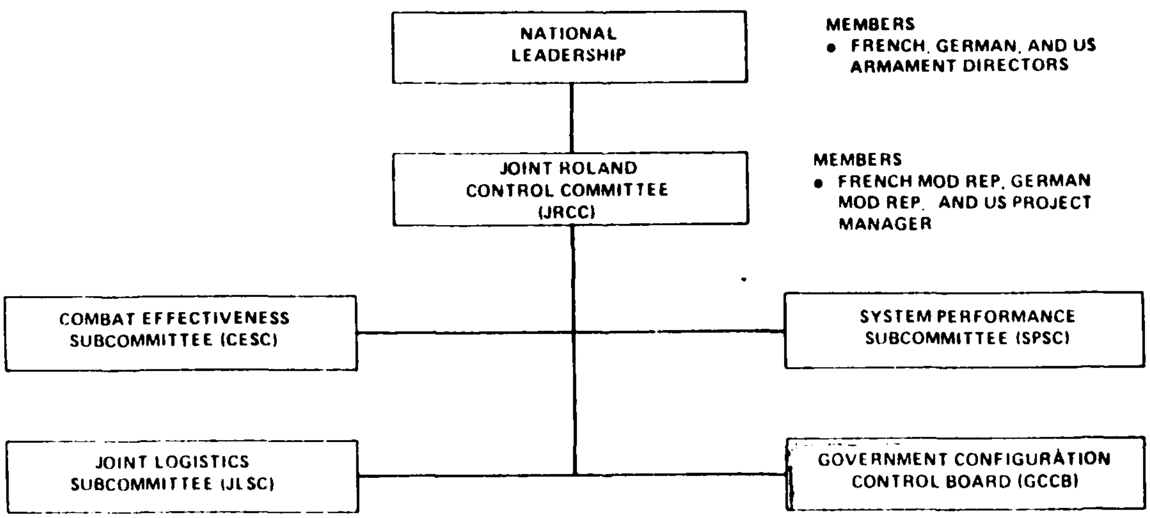
AN ITEM IS INTERNATIONALLY INTERCHANGEABLE IF IT IS EXCHANGEABLE IN FORM, FIT AND FUNCTION AND RETAINS THE SAME PERFORMANCE IT ORIGINALLY HAD. VARIATIONS IN SAFETY, RELIABILITY, MAINTAINABILITY, AND OTHER SIMILAR TRAITS MAY CHANGE, HOWEVER.

JOINTLY AGREED TO BY THE US, FRANCE, AND GERMANY

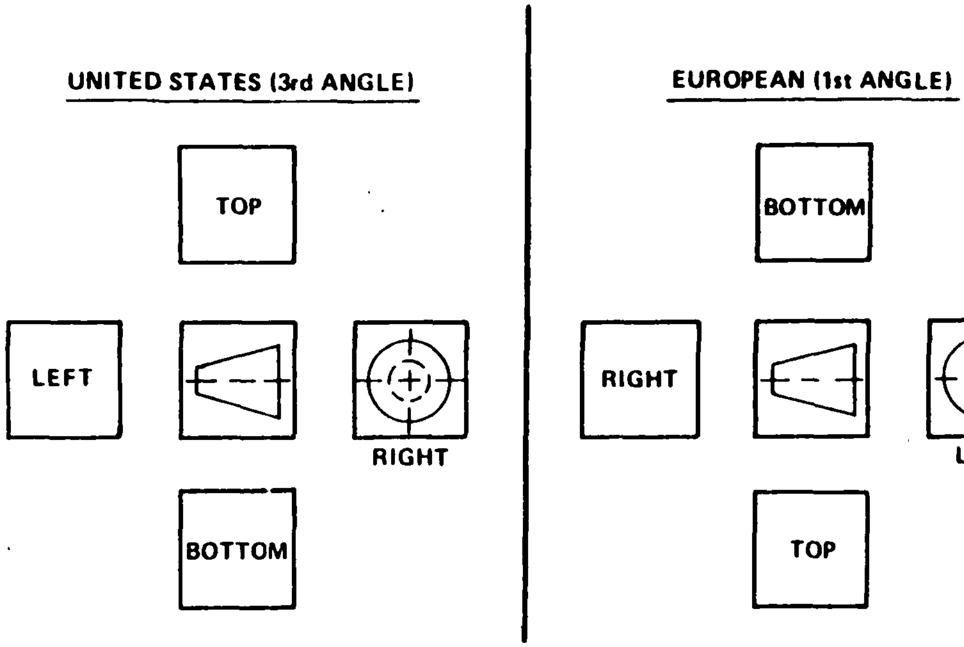
US ROLAND CHARACTERISTICS

- ALL WEATHER
- RAPID RESPONSE
- HIGH RATE OF FIRE
- AUTONOMOUS OPERATION
- MOBILITY
- SEARCH-ON-THE MOVE
- RAPID EMPLACEMENT/MARCH
- CERTIFIED MISSILE ROUND

ORGANIZATION OF THE JOINT ROLAND CONTROL COMMITTEE (JRCC)



DRAWING PROJECTION



USE OF MIL-STD-1679

BY

JOHN D. COOPER

ANCHOR SOFTWARE MANAGEMENT, LTD.
P.O. BOX 11046
ALEXANDRIA, VA 22312

22 MAY 1980

WHAT MIL-STD-1679 IS

- PURPOSE: "THIS STANDARD ESTABLISHES UNIFORM REQUIREMENTS FOR THE DEVELOPMENT OF WEAPONS SYSTEMS SOFTWARE WITHIN THE DEPARTMENT OF DEFENSE"
- MIL-STDS ARE CONTRACTUAL DEVICES
- DESCRIBES ONLY WORK TO BE PERFORMED
- ENCOMPASSES THE TOTAL SOFTWARE DEVELOPMENT PROCESS
- MINIMUM REQUIREMENTS FOR ANY SIZE OR TYPE OF DEVELOPMENT
- REQUIRES STATE-OF-THE-ART SOFTWARE DEVELOPMENT METHODOLOGY

WHAT MIL-STD-1679 IS NOT

- APPLICABLE RETROACTIVELY
- COMPETITOR TO ANY OTHER MIL-STD
- IT IS NOT A SYSTEM SPECIFICATION
- A REQUIREMENT ON THE GOVERNMENT
- AN IN-HOUSE GOVERNMENT REQUIREMENT
- CANNOT SPECIFY DELIVERABLES
- A SPECIFICATION OF "HOW-TO"
- DIRECTLY APPLICABLE TO SOFTWARE MAINTENANCE

SOFTWARE DEVELOPMENT PLAN

- INTRODUCTION
- PROJECT ORGANIZATION
- PROGRAM DESIGN APPROACH
- IMPLEMENTATION APPROACH
- RESOURCE UTILIZATION CONTROL
- CERTIFICATION TEST PHILOSOPHY AND PLANS
- PROGRAMMING SUPPORT CENTER FACILITIES
- QUALITY ASSURANCE
- PROGRAMMING STANDARDS AND CONVENTIONS
- CONFIGURATION MANAGEMENT
- GOVERNMENT FURNISHED EQUIPMENT AND SERVICES
- SOFTWARE INTEGRATION
- RISK AREAS
- SCHEDULES AND MILESTONES
- RESOURCE ALLOCATION

SOFTWARE QUALITY ASSURANCE PLAN

- INTRODUCTION
- ORGANIZATION
- QUALITY ASSURANCE PROCEDURES
- SOFTWARE DEVELOPMENT MANAGEMENT
- CONFIGURATION MANAGEMENT
- SOFTWARE SPECIFICATION, DESIGN, AND PRODUCTION
- SOFTWARE TESTING
- CORRECTIVE ACTION
- SUBCONTRACTOR CONTROL
- PLAN IMPLEMENTATION
- REPORTING AND CONTROL SYSTEM

SOFTWARE CONFIGURATION MANAGEMENT PLAN

- INTRODUCTION
- APPLICABLE DOCUMENTS
- SOFTWARE CONFIGURATION MANAGEMENT ORGANIZATION
- SOFTWARE CONFIGURATION IDENTIFICATION
- SOFTWARE CONFIGURATION CONTROL
- SOFTWARE CONFIGURATION AUTHENTICATION
- SOFTWARE CONFIGURATION STATUS ACCOUNTING
- INTERFACE MANAGEMENT
- SUBCONTRACTORS AND VENDORS

COMPUTER PROGRAM DOCUMENTATION

- ORIGINATED FROM SECNAVINST 3560.1
- LISTED IN THE AMSDL
- DEFINES THE MINIMUM SET
- DIDS FOR SOFTWARE CHANGE FORMS

SECONDARY REQUIREMENTS

- VERIFICATION AND VALIDATION
- TOP DOWN DEVELOPMENT METHODOLOGY
- STRUCTURED PROGRAMMING
- RESTRICTION ON BRANCHING
- PARAMETERIZATION OF SOFTWARE
- SUPPORT SOFTWARE DELIVERY
- RELIABILITY AND MAINTAINABILITY
- USE OF TRAINED PROGRAMMERS

INDIRECT BENEFITS

- SAFE FOR BLIND APPLICATION
- CRUTCH FOR SOFTWARE NAIVE MANAGERS
- STANDARDIZATION OF PROGRAMMING STANDARDS AND CONVENTIONS
- STANDARDIZATION OF DEFINITION AND PRIORITIES OF SOFTWARE ERRORS
- STANDARDIZATION OF SOFTWARE DOCUMENTATION
- STANDARDIZATION OF SOFTWARE CHANGE MECHANISMS
- PREVENTS CERTAIN "GOTCHAS" BY CONTRACTORS

HOW TO USE

- TAILORING FOR:
  - PROJECTS
  - APPLICATION AREAS
  - INSTITUTIONS
- RELATIONSHIP TO OTHER MIL-STDS
- TOP DOWN VERSUS CLASSICAL SOFTWARE DEVELOPMENT
- HIGH ORDER LANGUAGE
- DEVELOPMENT MONITORING
- INTERFACING REQUIREMENTS
- TURN-OVER PLANNING
- THIRD PARTY INVOLVEMENT
- CONTRACTING

STATEMENT OF WORK

- SYSTEM DESCRIPTION
- BASELINE DEFINITION
- DELIVERABLES SCHEDULE
- TASKING
- IDENTIFICATION OF SPECIFICS
- HOST AND TARGET COMPUTER IDENTIFICATION
- SUPPORT SOFTWARE
- CHANGE PROCEDURES
- THIRD PARTIES
- GFE AND GFI
- DD FORM 1423
- TRANSITION PLANS

CONTROVERSIAL ITEMS

- IT IS REQUIRED ON ALL SUBCONTRACTS
- FIRMWARE IS TREATED AS SOFTWARE
- AUTOMATIC TEST EQUIPMENT AND TRAINING SOFTWARE ARE INCLUDED IN ITS COVERAGE
- FLOW CHARTS NO LONGER A REQUIRED DELIVERABLE
- A 20% RESERVE OF SYSTEM RESOURCES IS REQUIRED AT TIME OF DELIVERY
- A LIMITATION ON MODULE SIZE IS SPECIFIED
- THERE ARE NO SPECIFIC REQUIREMENTS FOR RELIABILITY AND MAINTAINABILITY
- WORDING CONTAINED IN THE PROGRAM PERFORMANCE AND DESIGN REQUIREMENTS SECTIONS
- SUPPORT SOFTWARE AS A DELIVERABLE

CONTROVERSIAL ITEMS (CONT.)

- COST OF USING MIL-STD-1679
- APPARENT LARGE NUMBER OF REVIEWS
- VERIFICATION OF DOCUMENTATION TO BE DELIVERED
- RELATIONSHIP OF SECNAVINST 3560.1 DOCUMENTATION TO THE B5 AND C5 FROM MIL-STD-490
- TREATMENT OF BASELINES AND CHANGE CONTROL MECHANISMS

MISCELLANY

- ALL SERVICES ARE USING MIL-STD-1679
- INSTANCES OF BLIND INNOVATION
- ADAPTATIONS ARE APPEARING
- RETROACTIVE/IN-PROCESS INVOCATION
- SOFTWARE QUALITY ASSURANCE AWARENESS
- HOL'S FOR UNIQUE COMPUTERS
- SOFTWARE DEVELOPMENT FACILITY MOTIVATION

PARTS CONTROL EQUALS COST CONTROL

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SUMMARY

Electronic parts technology keeps expanding at a phenomenal rate. The impact of this advancement in science and production is not without impact on the cost of weapon systems and electronic equipment acquired for the defense of the nation. The price of documentation, testing, logistics and maintenance to assure the procurement of quality nonstandard electronic parts is a major force in driving upward the cost of DoD acquisition and follow-on support. This paper describes the benefits of parts control techniques and the utility values of standards when applied in DoD contracts. The authors show how relatively inexpensive standardization techniques during design can prevent acquisition and follow-on support costs by applying parts control requirements delineated in DoD Instruction 4120.19 and MIL-STD-965. The authors show how life cycle cost avoidance benefits in excess of $700 million were achieved by doing no more than using the talents of DoD personnel already on the payroll.

BACKGROUND - A former high level Department of Defense official once said that making changes in the DoD bureaucracy is like trying to push a rope. This same official was successful in establishing within DoD a highly cost effective technique to control the proliferation of data and an ever expanding supply inventory system for nonstandard parts. Because of the proliferation of parts documentation and growth in the supply inventories for electronic parts, David Packard, then the Deputy Secretary of Defense, directed in January 1971 the formulation of operational procedures and establishment of a pilot test for an integrated "Parts Control System."

The purpose of the program was to encourage and optimize the use of standard and preferred parts in design with particular emphasis during weapons systems acquisition. The experimental parts control effort was assigned to the Defense Electronics Supply Center (DESC) and proved to be both a cost effective and common sense method for design standardization. The test revealed the smart application of select mil specs and reuse of existing DoD engineering data for electronic parts could yield significant savings. The DoD Parts Control Program, using the technical services of engineers within the Defense Logistics Agency (DLA), was formally established in 1973 with DESC engineers designated a role as a Military Parts Control Advisory Group or "MPCAG" (pronounced Mip-Cag). While the parts control effort is still largely oriented to electronic systems (67% of the parts evaluated are in DESC supply classes) the subsequent establishment of three other MPCAGs within DLA gives the military services' acquisition managers a total DLA team support in selecting standard parts in the early phases of system acquisition.

ELECTRONICS - EXPENSIVE BUT WORTH IT - Traditionally, the Soviet military effort emphasizes large numbers of relatively simple weaponry. On the other hand U.S. military posture has favored fewer but more sophisticated equipment and systems. The U.S. attitude is deeply rooted and depends greatly upon our superior capabilities in electronics, especially with semiconductors.

As we are finding out, sophisticated electronic gear does not come cheap. For example, recent studies estimated the annual DoD cost for maintenance of the electronic in-use inventory to be $6.1 billion. Rapid changes in the design of electronic equipment have created a phenomenal proliferation of electronic piece parts such as integrated circuits, transistors, diodes, thyristors, resistors, capacitors, switches, transformers, coils, filters, connectors, etc. Systems application of this complex equipment is demanding higher performance and improved reliability be realized from the standardization of the working components. The cost to maintain electronics requires the DoD to buy each year about $2 billion worth of engineering drawings, technical manuals, specifications, test reports and other kinds of data [1]. Much of the cost of this data can be avoided if the technical bureaucracy could reuse prior engineering decisions made in the form of standards and military specifications tailored to the needs of specific acquisitions. Depending upon the complexity, uniqueness and end item application of a particular device type, the DoD cost in systems acquisition to document and test one electronics part type ranges from a few hundred

dollars to $25,000. The cost impact is staggering when we realize between 50,000 and 100,000 electronic items are proposed for stock numbering each year!

STANDARDIZATION DURING DESIGN - The decision to implement parts control during design has proven to be a wise one. Since the decision was made to establish MPCAGs in DLA in 1973, more than 795 design contracts have received parts control support (See figure 1). The value of the service has been estimated to yield life cycle cost benefits in excess of 700 million dollars.

Prior to parts control, a fallacy in parts standardization during design has been the absence of uniform techniques to assure the optimum application of standard parts among and between the military services. Because of this fallacy, the acquisition manager has on many occasions acquiesced to the pressures of cost and time by allowing many nonstandard parts to be designed into new military equipment. The unhappy results of this lack of standardization during design is poor equipment reliability in the field and excessive proliferation of nonstandard parts in DoD logistics inventories. This situation has not been caused by a lack of recognition of the value of standardization by both govenment and industry. On the contrary, numerous government studies have been conducted in the past, all of which expounded on the virtues of standardizing during equipment design. Industry's view of standardization was probably stated best by W. F. Rockwell, Jr., Chairman of the Board of Rockwell International Corporation, when he said: "Contracts with the Defense Department impose various requirements upon the contractor . . . of all the imposed requirements, there is probably none as mutually beneficial to both the customer and the contractor as the requirement for standardization [2]."

The new DoD Parts Control Program is designed to give strength to the inherent weakness in new design part selection by assuring that standardization decisions remain with the acquisition manager who is responsible for cost and schedule. More importantly, the new program also provides for an engineering workforce of 300 engineers and technicians in the Defense Logistics Agency (DLA) to be at the disposal of all acquisition managers in the military departments. These DLA parts experts can provide their expertise to the acquisition manager and his contractor in the selection and use of preferred standard parts in new design. Furthermore, these parts engineers and technicians are able to provide their support in a very timely manner, having imposed a seven day turnaround time on themselves for responding to part evaluation requests. (Frequently, a response is forthcoming the same day when telephone inquiries are received). By using this reservoir of engineering talent at no charge to the contract, the acquisition manager can save precious costs and time.

Before elaborating further on a proven solution to standardization weaknesses, let us examine other factors contributing to the problem.

THE INEFFICIENCY OF MIL-STD-749 - Prior to the DoD Parts Control Program, procedures for obtaining approval to use nonstandard parts in new equipment varied greatly among and within the military services. The technique most often used was described in MIL-STD-749 "Preparation and Submission of Data for Approval of Nonstandard Parts." Under this procedure, when the contractor could not identify standard parts to meet his application, he started with what was called step I of MIL-STD-749 to justify the use of a nonstandard part.

The justification, including a comparison with the nearest standard part, was submitted to the procuring activity for approval. At least a 30 day turnaround was expected for the part approval process.

After review of the nonstandard part justification and if the part was approved, the approving agency informed the contractor whether to proceed with steps II and III of MIL-STD-749. Step II required the contractor to prepare a drawing or specification covering electrical parameters, quality assurance procedures, etc. Step III required the submission of test data to verify the nonstandard part meets the requirements outlined in step II.

All documentation required by step II and step III were to be submitted to the procuring activity for approval within 30 days for each step. To save time, many equipment specs required that steps I and II of MIL-STD-749 be submitted simultaneously.

This method of operation was considered to be a cost driver in DoD contracts. To compound the problem, the military services didn't have the man-power to review all the paperwork called for in MIL-STD-749. The standards engineers became part of the problem rather than a solution. The Government Accounting Office (GAO) reported that one activity required 117 days to process a nonstandard part approval request. The same report also stated that the government pays between $500 and $8000 for each part documentation and up to $25,000 for testing to insure that the item meets military requirements [3].

An added factor of confusion for the contractor was that each military service and even procuring activities within the same service could not agree on what constituted a "standard" part.

If you add the fact that the military services also differed greatly in the method of applying MIL-STD-749, the result is a costly standardization effort with less than optimum effectiveness.

IS "BUYING COMMERCIAL" A SOLUTION? - It is natural to assume that the "buy commercial" philosophy currently in vogue may be a solution to the problem of the cost of part documentation. That philosophy suggests that the government buy commercial equipment as produced for the commercial market-place [4], that is, without part documentation and testing and their associated costs.

The concept of buying commercial seems very attractive, and, in fact, it is fine for common electrical hardware supplies. However, the philosophy

should not be taken as a signal to cancel all military specifications, especially those that are used daily on a very cost effective basis. The key to determining if commercial buying is appropriate for a given application lies in verifying that such commercial product will adequately serve the government's requirements. It has been generally agreed by electronics experts that commercial quality electronic parts will not meet the stringent requirements required of our sophisticated weapon systems. The following quotes attest to this agreement:

---"A key ingredient in achieving the F-15 levels of reliability is the high-reliability parts control and standardization program.-----Established Reliability (ER) capacitors and resistors, tested extra (JANTX) transistors and diodes, and integrated circuits selected through "MIL-M-38510 and screened to MIL-STD-883 Class B level, are emphasized.---."[5]

---"The non-Mil Class B screened microcircuit removals or fallout were 2.73 times the number of removals experienced for MIL-M-38510 Class B microcircuits. A major factor contributing to nearly triple non-Mil microcircuit fallout is attributed to lower quality due primarily to procurement specification and surveillance differences---." [6]

---"DoD publishes standards and specifications on a number of standard integrated circuits using MIL-M-38510 as a vehicle. Contracting methods now encourage systems developers not to use these parts because they receive G & A and profit for nonstandard part specification preparation and qualification." [7]

There is no implication here that we do not support DoD policy on commercial acquisition. On the contrary, commercial product should be used when such products satisfy the requirements of the military services. The fact remains that in the area of electronics, the military specifications have been developed primarily because commercial equivalent parts could not withstand military environments over time. These military specifications covering electronic part types, should be maintained and industry standards adopted whenever possible.

THE DOD PARTS CONTROL PROGRAM - The Parts Control Program was established by the Secretary of Defense to help reduce weapon system/equipment acquisition and support costs by encouraging the use of preferred standard parts during design while striving to minimize the variety of part types used. To accomplish these objectives, the military services turned to DLA parts engineers for support. Subsequently, MPCAGs have been established at the following four major supply centers of DLA: Defense Electronics Supply Center (1973), Defense Industrial Supply Center (1975), Defense General Supply Center (1978), and Defense Construction Supply Center (1978).

The payoff from the program is vested in the ability of DLA engineers to preclude costly documentation and testing of parts while avoiding the unnecessary addition of nonstandard part types into logistic inventories. To accomplish this, it is obvious that a significant part of the effort must go toward keeping military specifications and standards up-to-date consistent with current technology.

Briefly, the program operates this way: Contractors can query a MPCAG for recommendations on parts to meet their system requirements by telephone, telegram or written request. The MPCAG makes an engineering evaluation to uncover possible standard parts to meet their requirement. This informal exchange of information saves much paperwork and time and provides the equipment acquisition manager with solid technical recommendations on which to base a final decision. The bulk of MPCAG evaluations however consists of the review of Program Parts Selection Lists (PPSLs) proposed by contractors as an initial baseline of preferred parts and is used to limit the variety of parts to be used on the contract. The benefit of the PPSL is enormous since it can be used on other programs further downstream. While item entry is important, the driving force behind the program is enhanced reliability, maintainability and configuration control through cost effective specifications.

MIL-STD-965 - MIL-STD-965, Parts Control Program, is the military standard which along with apprioriate Data Item Descriptions (DIDs) is applied to implement the guidelines and requirements established by DoD Instruction 4120.19, Department of Defense Parts Conrol System. MIL-STD-965 reduces costs and shortens approval time by permitting contractors to use DLA MPCAGs for advice on the use and availability of standard or preferred parts.

The document is tailorable to specific design needs and can be applied in a variety of ways to yield maximum benefits to the acquisition. The standard was issued in April 1977 and amended to include tailoring guidance in December 1978. The Appendix to MIL-STD-965 establishes the following guidance on the application of parts control:

MIL-STD-965 describes two procedures covering the submission, review and approval of Program Parts Selection Lists (PPSLs) and changes thereto; Procedure I is usually applied on contracts for less than major systems and few subcontractors are involved, thus not requiring the use of Parts Control Boards (PCBs). Procedure II on the other hand is the method used when PCBs are required.

On major system acquisitions, it has been shown that periodic face-to-face meetings between the prime contractor, subcontractors and government parts experts can be very cost effective, thus the use of Parts Control Boards (PCBs). A modified PCB approach can be applied to "less than system" acquisitions involving but one or two contractors in the design effort. The term "Parts Advisory Group" or PAG is often used when a "mini" PCB is considered appropriate. The PPSL is used with either procedure.

THE FLEXIBILITY OF PPSLs - The intent of a PPSL is to obtain maximum reuse of documentation in design by tailoring and minimizing the variety of different types, grades or classification of parts to be applied in the acquisition. The PPSL is fluid and can be frequently adjusted during the various design phases as problems are resolved and technology progression dictates. One value of the PPSL lies in the opportunity for automation and reduction of paperwork by handling bulk transactions rather than initially requiring the contractor to submit and justify each nonstandard part. The PPSL procedure discourages the premature preparation of parts documentation

pending the determination that a standard part of equivalent quality is not already available. Requirements for test data are tailored to reflect realistic requirements commensurate with the program scope and phase. The acquisition manager is urged to use caution before requiring test data prior to establishing a firm application requirement for the item and the need for reviewing test data. A PPSL is not always appropriate for all design programs in which case only nonstandard parts are controlled. However, it has been determined that PPSL concepts are cost effective in the acquisition of most new equipment and systems. Through automation techniques developed over the past five years, the MPCACs can prepare and maintain PPSLs as a service to the acquisition manager.

Let us now analyze the value of the program.

THE VALUE OF PARTS CONTROL DURING EARLY ACQUISITION PHASES - In assessing the value of parts control in design, we must deal not with the lowest price, but rather with the most realistic cost impacting the overall affordability of the weapon system or equipment.

Our claim that "parts control equals cost control" is quite valid as we shall now show. Several cost drivers related to poor parts control have been clearly identified in numerous studies and repeatedly highlighted to DoD by the General Accounting Office (GAO). They are:

a. Design costs to procure/develop documentation for so called "nonstandard" parts.

b. Redundant or unneeded testing of parts already qualified to military requirements.

c. Time and costs expended in the provisioning process to obtain a National Stock Number (NSN) for a nonstandard part and the resulting costs to maintain the item in stock for ten years or more.

d. Poor equipment performance in the field and increased maintenance costs from using too many varieties of nonstandard parts with uncertain quality.

Let us now proceed to ascertain how parts control can alleviate much of the high cost caused by nonstandard part usage pressures in each of the drivers pinpointed above.

COSTS TO DOCUMENT NONSTANDARD PARTS - It is well recognized that by their very definition nonstandard parts must be documented to assure re-procurability via provisioning and follow-on logistic support. Such documentation, through equipment manufacturer specification/control drawings or military service drawings, is almost always considered crucial by the military for configuration control, reliability and maintainability. The parts control program advocates the reuse of documentation already available in the form of military specifications for the vast majority of electronic items and thus preclude the cost of "new" documentation for parts already approved for use (i.e. standard) in DoD systems. The cost to buy

engineering drawings for nonstandard parts in design does not come cheap. According to the National Aerospace Standards Committee (NASC) of the Aerospace Industries Association (AIA), man-hours to prepare documentation for nonstandard parts can be extensive, as much as 220 man-hours for an integrated circuit and 246 man-hours for some electromechanical parts. Using data from a survey made by NASC, [8] we have been applying predetermined factors to assess documentation costs saved when a nonstandard part type is avoided by parts control techniques.

The cost-benefit method applied under the DoD Parts Control Program uses a conservative rate of $25 per hour to represent engineering effort, overhead, and profit to prepare documentation (A survey made by NASC in 1978 revealed $34 an hour will be used in their cost-benefit methodology). Using $25 per hour, the estimated benefit from preventing the preparation of nonstandard part documentation is:

TABLE 1: Cost to Document Parts

Product	Avg Hrs/ Drawing	Cost Avoided at $25/hr. Avg	Range
Resistors, Capacitors, Filters, Coils	34.8	$870	$400-3625
Fuses, Ckt Breakers, Switches, Connectors, Relays, Waveguides, Wire, Cable	56.6	$1415	$450-6150
Eltr Tubes, Transistors, Diodes, Xtals	46.9	$1173	$400-4250
Integrated Circuits	71.7	$1793	$600-5500

According to the NASC survey, 67% of the drawings on the typical design program are new drawings. To assess the benefits of parts control and to assure a conservative approach, we assume a drawing is prevented only 50% of the time when a nonstandard part type is replaced by a standard type through parts control.

COST TO TEST PARTS - A major share of the cost of an acquisition is devoted to testing. To pass equipment qualification tests, manufacturers invest heavily in verification testing of the parts going into the equipment. (Parts testing is also important to meet reliability prediction requirements contractually specified.) Testing of nonstandard parts is a cost driver which can be avoided through parts control and the use of standard parts.

Items described to military specifications are required to perform satisfactorily under military operating conditions, stress and environment. Normally, the cost of testing military standard parts is included in the price of the part since manufacturers voluntarily test their part for government approval and listing in Qualified Products Lists (QPLs). Since military specification parts are widely used, the cost of testing is relatively inexpensive when prorated to thousands of standard parts produced and sold by the manufacturer.

Parts manufacturers have informed DESC electronics engineers that their investment in the testing of a new part can range anywhere from $5,000 to $25,000. (For example, the testing of a new integrated circuit device has been estimated as high as $100,000.) The American Institute of eronautics and Astronautics (AIAA) in a report confirmed that product testing is a very significant cost. As for piece parts, firms surveyed indicated that it was company policy and common practice to test all nonstandard electronic parts used in new equipment. As in the case of nonstandard part drawings, the cost avoidance estimates for preventing testing costs are calculated from a conservative viewpoint. In our cost-benefit rationale we estimate testing costs are avoided on only 25% of the nonstandard parts replaced by standards.

Table 2 shows the cost avoidance from eliminating the need to test a nonstandard part.

TABLE 2: Cost to Test Parts

Product	Est Cost to Test
Resistors, Capacitors, Filters, Fuses, Ckt Brkrs Coils	$5,000
Connectors, Wire, Cable	5,500
Switches, Relays, Waveguides	6,000
Eltr Tubes, Transistors Diodes, Crystals	10,000
Integrated Circuits	25,000

<u>NEW DRAWINGS ADD NEW SUPPLY ITEMS</u> - One of the most maligned standardization efforts in the DoD is the task of consolidating and eliminating stock items in supply inventories by joint coordination among the military logistic and engineering communities. Nonstandard parts are almost impossible to screen since they are often assigned part numbers not trackable to the actual part manufacturer. A major impedime,* to item reduction is the lack of adequate information by all participants t. assure parts can be interchanged without harming the design function intendea.

According to a report of the GAO, the lack of centralized effort to control parts selection in design leads to the cataloging of items unnecessarily in the government supply system. Parts control is intended to prevent the unnecessary growth of nonstandard parts in DoD supply by offering design contractors standard parts already documented in specifications and standards. The cost driver associated with the assignment and retention of new NSNs to nonstandard parts for logistic support activity should be analyzed closely. Drawings are the underlying cause of NSN proliferation through the entry of nonstandard parts into the DoD inventories. The real proliferation occurs when the same or similar nonstandard parts are described in different contractor or service agency specifications or drawings and they too are assigned NSNs.

According to the previously mentioned NASC survey [9], drawings for nonstandard piece parts list an average of 7.3 different items per drawing. The entry of each of these items into DoD supply bins represents a 10 year operating cost of $165 per year per item. The cost to enter an item in the inventory is $207. An approved nonstandard part type will add at least 3 new supply items when a new drawing is created.

If we apply these cost values to a single nonstandard part entering the DoD inventory and being retained in supply bins for 10 years we get:

Entry of one item (NSN assignment)	$207
Management of NSN for 10 years	$1650
Total logistic cost of a single new nonstandard part	$1857

If we apply the premise that a standard part type prevents the development of a new document 50% of the time, then three new potential NSNs are also prevented. Thus, the logistics benefit from avoiding nonstandard part documentation is 50% X 3 X 1857 = $2,785.50.

WHAT ARE WE WILLING TO PAY FOR POOR EQUIPMENT PERFORMANCE? - There is no easy way to compare cost relationships directly attributable to failures caused by not using high reliability electronic parts. The use of such parts can increase part costs from a small percentage (or even a slight decrease for some popular hi rel parts) up to three times the cost of commercial types. The extra cost at the part level could be worth it when you think of the following circumstances:

According to a Navy reliability authority, the cost to find a defect at "module level is $110. At the next level the cost is $200. If you are going to find it at a system level the cost is $675. If you're going to find it at an installed level, it's $1100."

According to Dr. George Heilmeier, former Assistant Director, (Electronics and Physical Sciences), DDR&E [10] the DoD must pursue a continuing and comprehensive program to lower costs and improve the reliability of electronic equipment. Dr. Heilmeier expressed his concern that the government frequently buys inferior components to "in-house" part numbers, when Mil parts were available with average failure rates approaching .0045

percent/1000 hours. Dr. Heilmeier stated that each part failure in the field represented a maintenance action costing on the average over $300, and this did not include loss of equipment, life or mission effectiveness.

A research study on radar reliability demonstrated that emphasis on parts screening requirements of Established Reliability (ER), JANTX, and MIL-M-38510 military specifications would maximize performance and minimize costs. The report recommended that the use of lower graded devices be prohibited in electronic systems. Results of the study also indicated the use of high reliability electronic standard parts reduced maintenance actions by a factor of 3:1.

The Electronics-X report revealed that the annual maintenance costs for electronics in the DoD was $6.1 billion [11]. Estimates of the cost of a field maintenance action ranged from $225 to $408 per action.

In developing our cost-benefit model for the DoD Parts Control System, we wanted to include a factor showing the cost maintenance impact when nonstandard parts are designed into equipment. We chose $300 as a reasonable estimate. Because of the high quality factors applied to mil items in MIL-HDBK-217 (Reliability Prediction), we had no problem in applying a best estimate that the prevention of one nonstandard electronic part type by the use of a standard type will avoid at least one maintenance action per year for 10 years. Using $300 as the average cost per maintenance action, the maintenance cost avoided by using standard electronic part type is $3,000.

APPLICATION OF COST AVOIDANCE FACTORS - To evaluate the benefits from applying the DoD Parts Control Systems, the DLA MPCAGs use "would have" cost computations to measure life cycle costs avoided when a new nonstandad part type is not used bcause of a preferred part type recommended to the contractor by a MPCAG engineer. In other words, the benefits are derived from what equipment "could have cost" if parts control techniques were not applied. In the electronics area the following predetermined life cycle cost (LCC) avoidance factors are used.

TABLE 3: Life Cycle Cost Avoidance Factors

Product Category	LCC Avoidance Factor of One Type
Resistors, capacitors, filters, coils, transformers	$7470.50
Circuit Protection Devices	4743.00
Switches & Relays	7993.00
Electrical Connectors, Wire, Cable	7868.00
Diodes, Transistors, crystals, tubes	8872.00
Integrated Circuit Devices	12932.00

Each year, using the above factors, the DESC MPCAG computes the value of parts control service to DoD contractors by multiplying the number of nonstandard part types avoided in each product category times the approved

LCC Avoidance factor. In FY 1979 the sum of the FSC cost avoidances was in excess of $126 million! The cost of the MPCAG operation was only $1.4 million, a return on investment of 89 to 1! (See figure 2).

Long Term Results - Since the program started in 1972 DESC engineers provided 72,000 recommendations (See figure 3) that prevented the entry of nonstandard parts into the logistics pipeline. These recommendations prevented 36,000 new drawings from being developed and stopped 18,000 unneeded product tests. In addition, parts control managers believe we are being very conservative when we claim 54,000 new items were kept out of the DoD supply bins by the actions of the DESC MPCAG (See figure 4). The life cycle cost avoidance of the 72,000 recommendations is more than $700 million.

The Bottom Line - Practically all failures of defense systems can be attributed to failure of some part not meeting its design requirements. While benefits of the Parts Control Program cannot be easily analyzed, they are consistent with mass production philosophy and competitive spirit of industry. DoD analyses show that significant savings are being achieved. Acquisition costs are reduced by eliminating the need for contractor drawings which identify similar parts or nonstandard parts which can be replaced by military standards. This also serves to eliminate the cost of verification testing of nonstandard parts. Logistics costs are reduced through less cataloging effort, less maintenance of stock, less salvage of inventoried items and less expensive but better quality replacement parts. Maintenance costs are reduced through lower failure rates and thus reduced maintenance actions.

A wise man once said that "the bitterness of poor quality is long remembered after the sweetness of low cost is long forgotten." Because cost overruns seem endemic to large government programs, there is great temptation to treat cost and time as the most crucial target for system acquisition. We can be smarter in weapon system acquisition by using parts control and standardization during design. The pitfalls of costly engineering documentation, testing, logistics and maintenance associated with acquisition and deployment of military systems can be avoided if we allow parts control to give us cost control.

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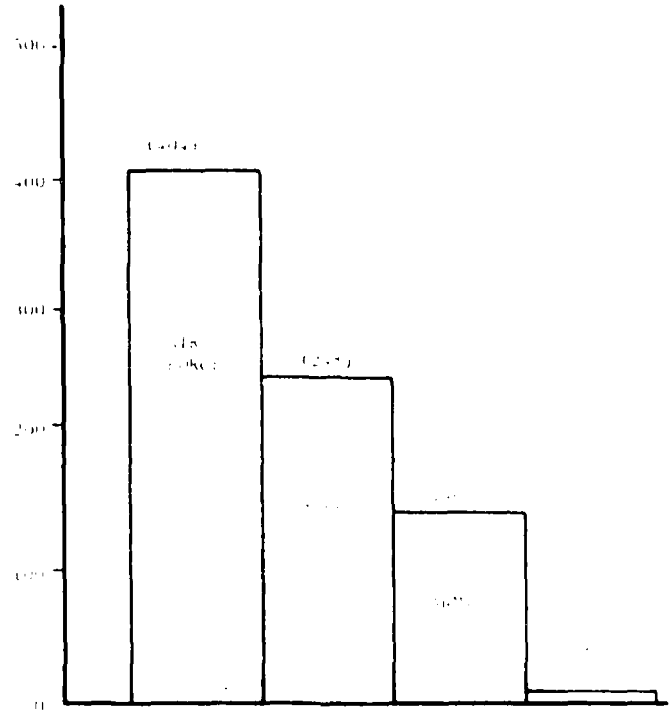


FIGURE 1: DoD PARTS CONTROL PROGRAM CONTRACT[illegible] SUPPORT BY MPCAG, 197[illegible] THROUGH [illegible]

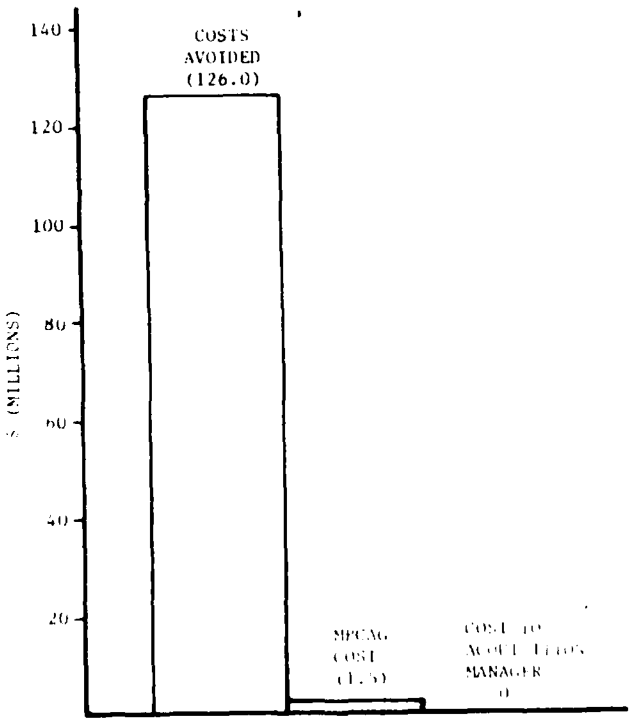


FIGURE 2: BENEFITS VS COSTS

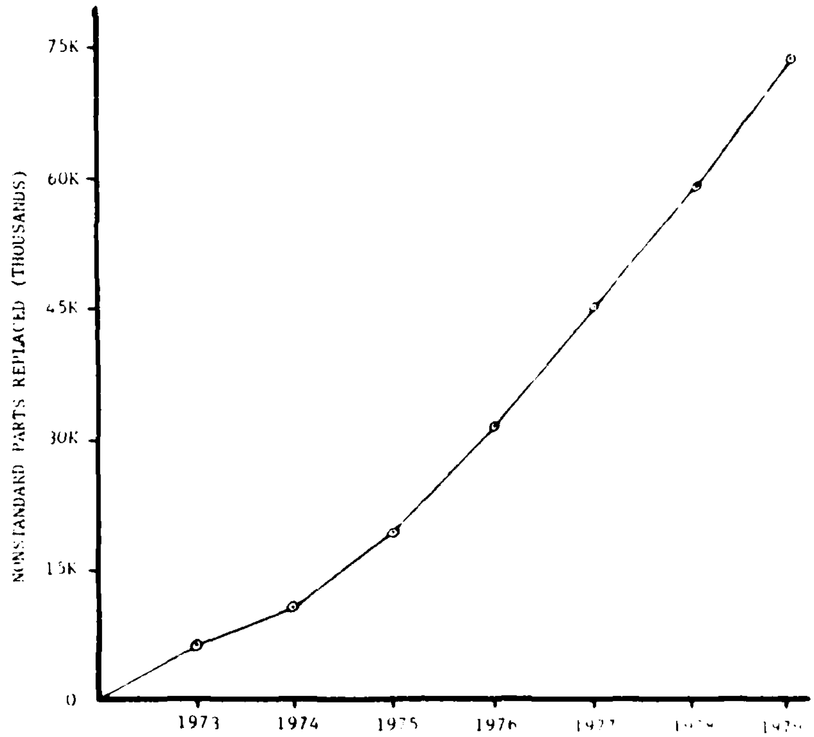


FIGURE 3: CUMULATIVE NONSTANDARD PART TYPES REPLACED WITH PREFERRED STANDARD TYPES

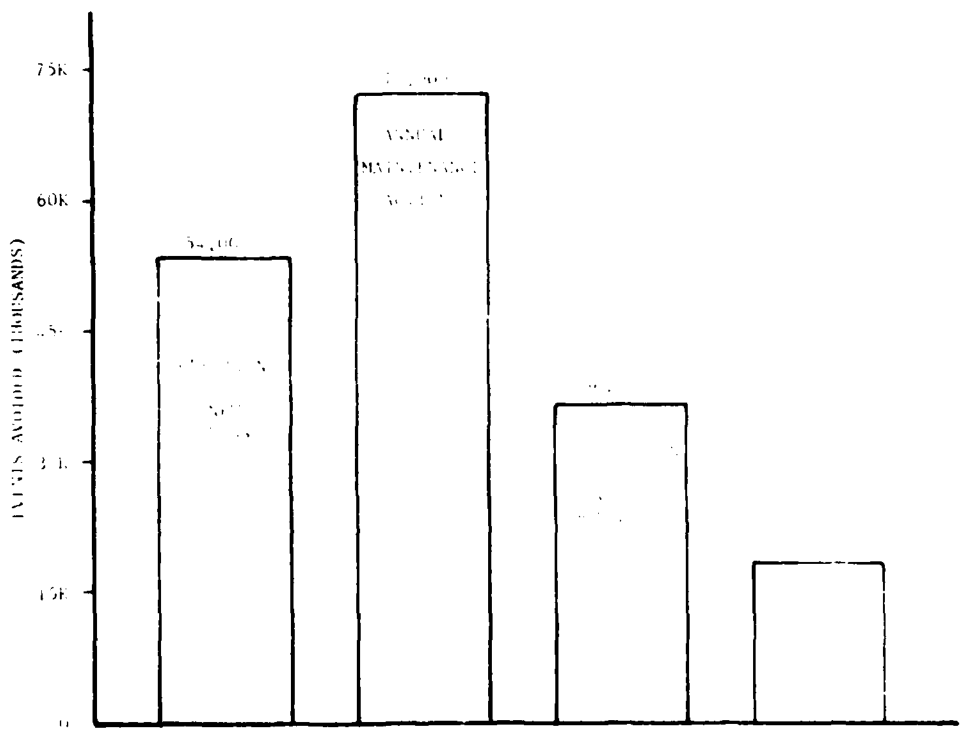


FIGURE 4: EVENTS AVOIDED BY [illegible] CONTROL [illegible]

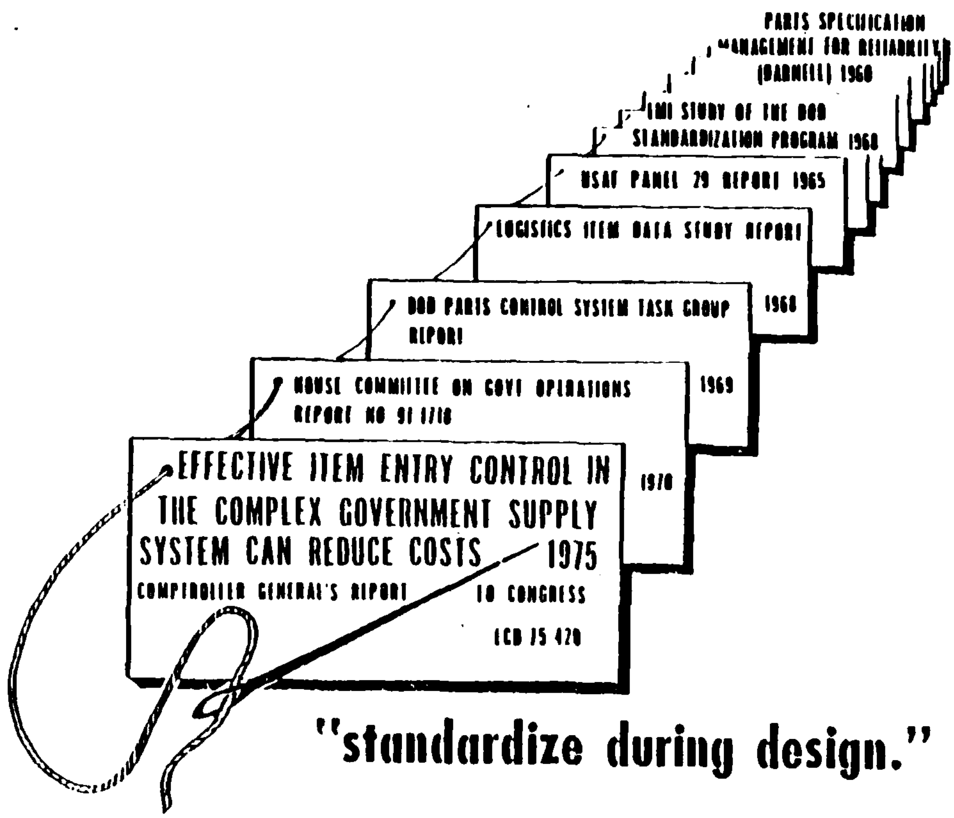
PARTS CONTROL = COST CONTROL

By DONALD K. SWANSON
AND
CHARLES E. GASTINEAU

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO

TOPICS

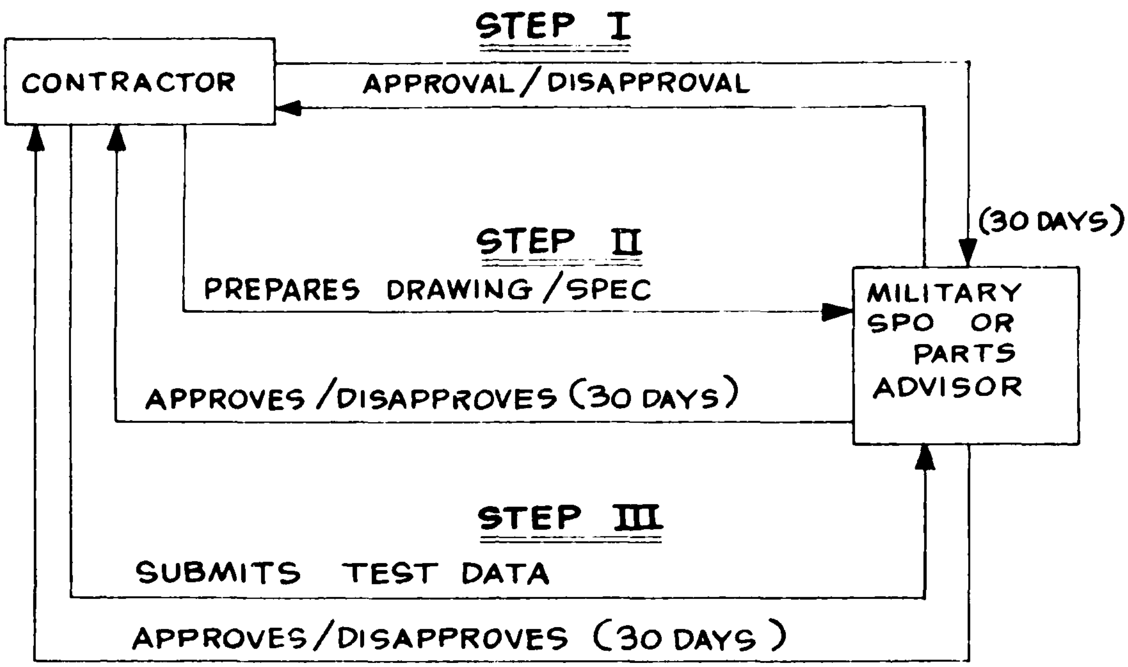
- BACKGROUND
- PROBLEMS
- SOLUTIONS
- COST/BENEFITS



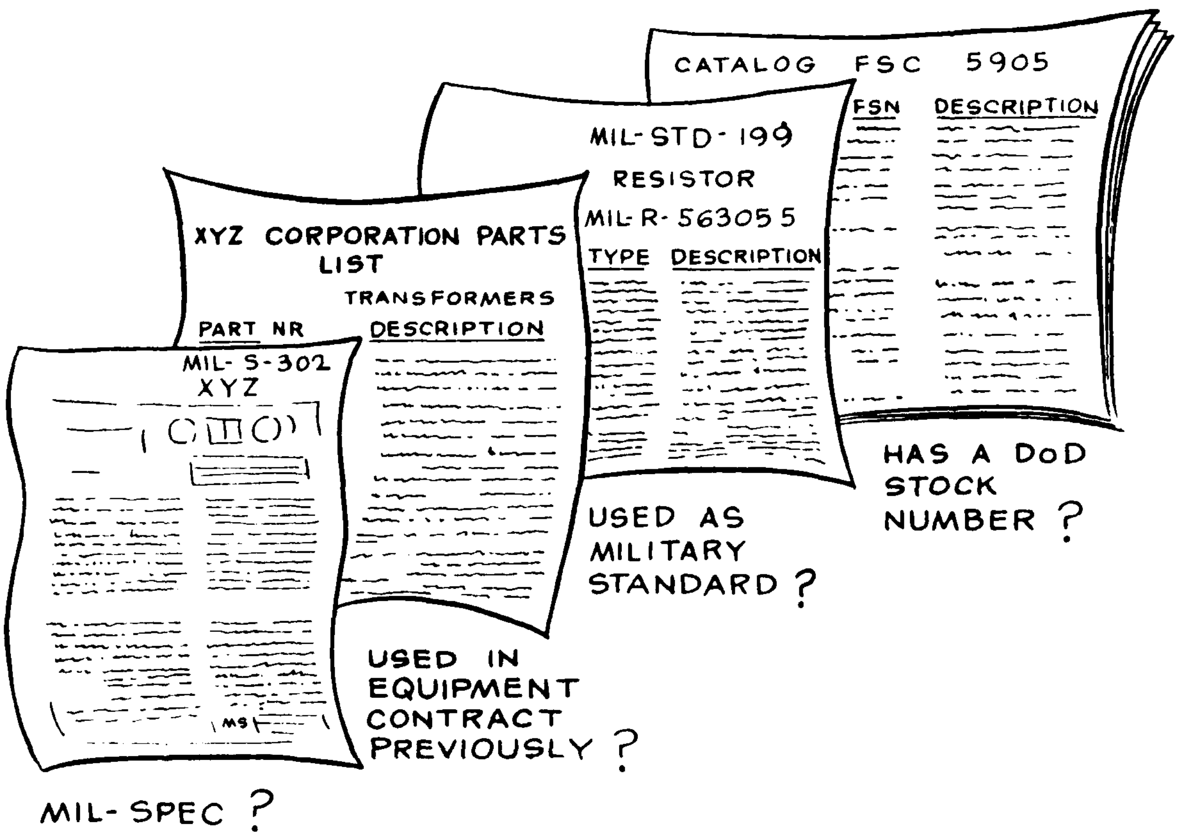
" CONTRACTS WITH THE DEFENSE DEPARTMENT IMPOSE VARIOUS REQUIREMENTS UPON THE CONTRACTOR . . . OF ALL THE IMPOSED REQUIREMENTS, THERE IS PROBABLY NONE AS MUTUALLY BENEFICIAL TO BOTH THE CUSTOMER AND THE CONTRACTOR AS THE REQUIREMENT FOR STANDARDIZATION "

W. F. ROCKWELL, JR.
ROCKWELL INTERNATIONAL CORP.

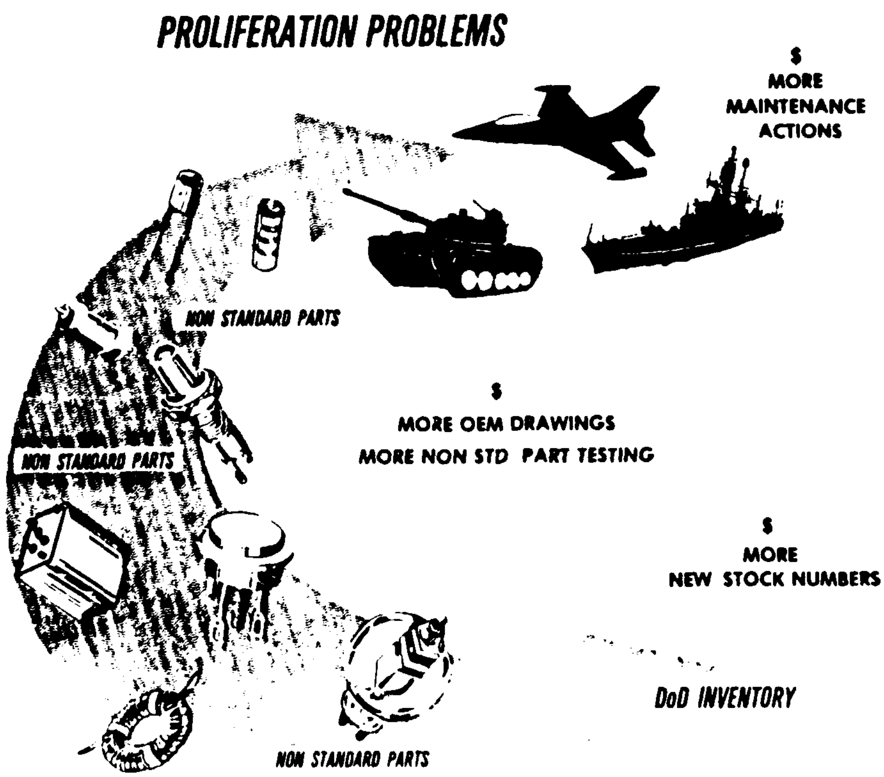
NON-STANDARD PARTS APPROVAL REQUEST



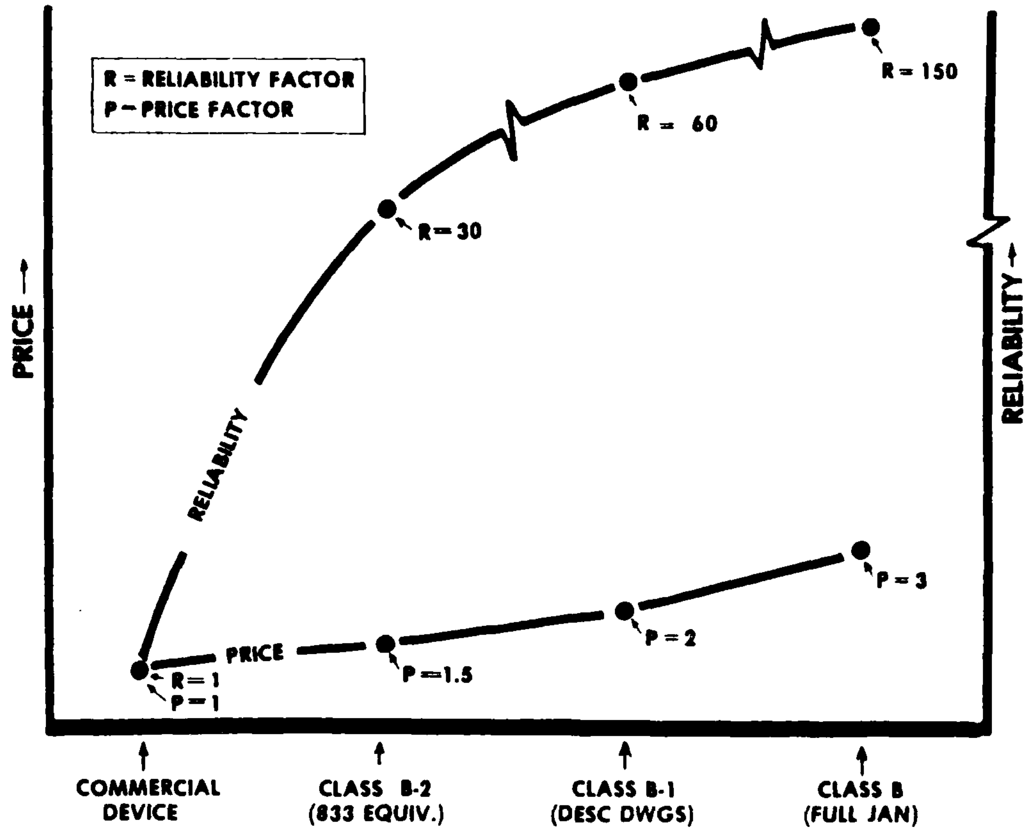
WHAT IS A STANDARD PART ?




NSP
REQUEST
APPROVED


PROLIFERATION PROBLEMS
$
MORE
MAINTENANCE
ACTIONS
NON STANDARD PARTS
$
MORE OEM DRAWINGS
MORE NON STD PART TESTING
NON STANDARD PARTS
$
MORE
NEW STOCK NUMBERS
DoD INVENTORY
NON STANDARD PARTS

COMMERCIAL VS MIL SPEC MICROCIRCUITS



new DoD parts control system

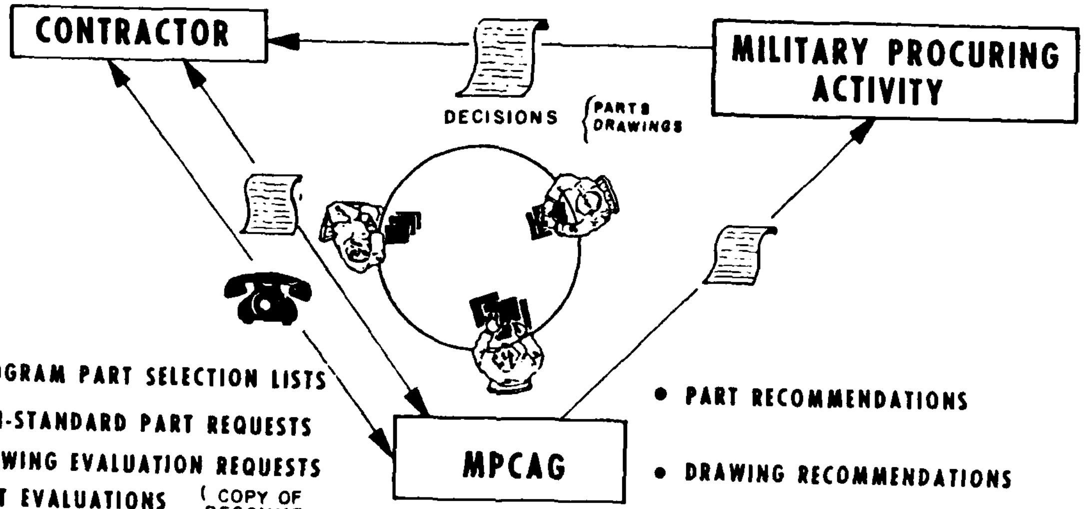
DoD INSTRUCTION 4120.19 "DEPARTMENT OF DEFENSE PARTS CONTROL SYSTEM" Dated: 16 DECEMBER 1976

IMPLEMENTING DOCUMENT		SUPERSEDED DOCUMENTS
MIL-STD-965 PARTS CONTROL PROGRAM	REPLACES	~~MIL-STD-749~~
		~~MIL-STD-891(USAF)~~
		~~MIL-STD-1631(NAVY)~~
		~~MIL-STD-1652(NAVY)~~
Dated: 15 APRIL 1977		

PARTS CONTROL SYSTEM OBJECTIVES

- MINIMIZE VARIETY OF PARTS
- ENHANCE SYSTEM RELIABILITY AND MAINTAINABILITY
- KEEP SPECIFICATIONS AND STANDARDS CURRENT

MPCAG continuing support



- PROGRAM PART SELECTION LISTS
- NON-STANDARD PART REQUESTS
- DRAWING EVALUATION REQUESTS
- PART EVALUATIONS (COPY OF RECOMMENDATIONS)
- DRAWING EVALUATIONS (COPY OF RECOMMENDATIONS)
- MIL SPECS (NEW & REVISED)
- QPL INFORMATION
- SPEC INTERPRETATION

- PART RECOMMENDATIONS
- DRAWING RECOMMENDATIONS
- PART AVAILABILITY DATA
- PARTS CONTROL MEETING PARTICIPATION

THE VALUE OF PARTS CONTROL

Value of design documentation cost avoidance (one time)

plus

Value of testing cost avoidance (one time)

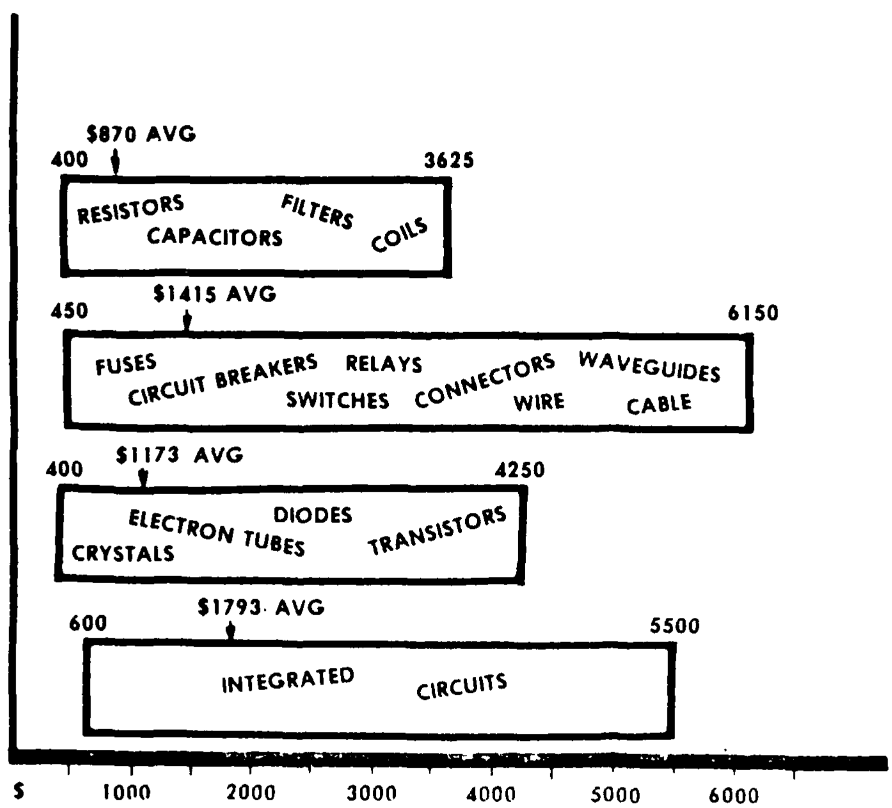
plus

Value of supply management cost avoidance (ten years)

plus

Value of maintenance cost avoidance (ten years)

COST TO DOCUMENT PARTS



COST TO TEST PARTS

PRODUCT	EST COST TO TEST
RESISTORS, CAPACITORS, FILTERS, FUSES, CKT BRKRS, COILS	$ 5,000
CONNECTORS, WIRE, CABLE	5,500
SWITCHES, RELAYS, WAVEGUIDES	6,000
ELTR TUBES, TRANSISTORS DIODES, CRYSTALS	10,000
INTEGRATED CIRCUITS	25,000

COST OF LOGISTICS

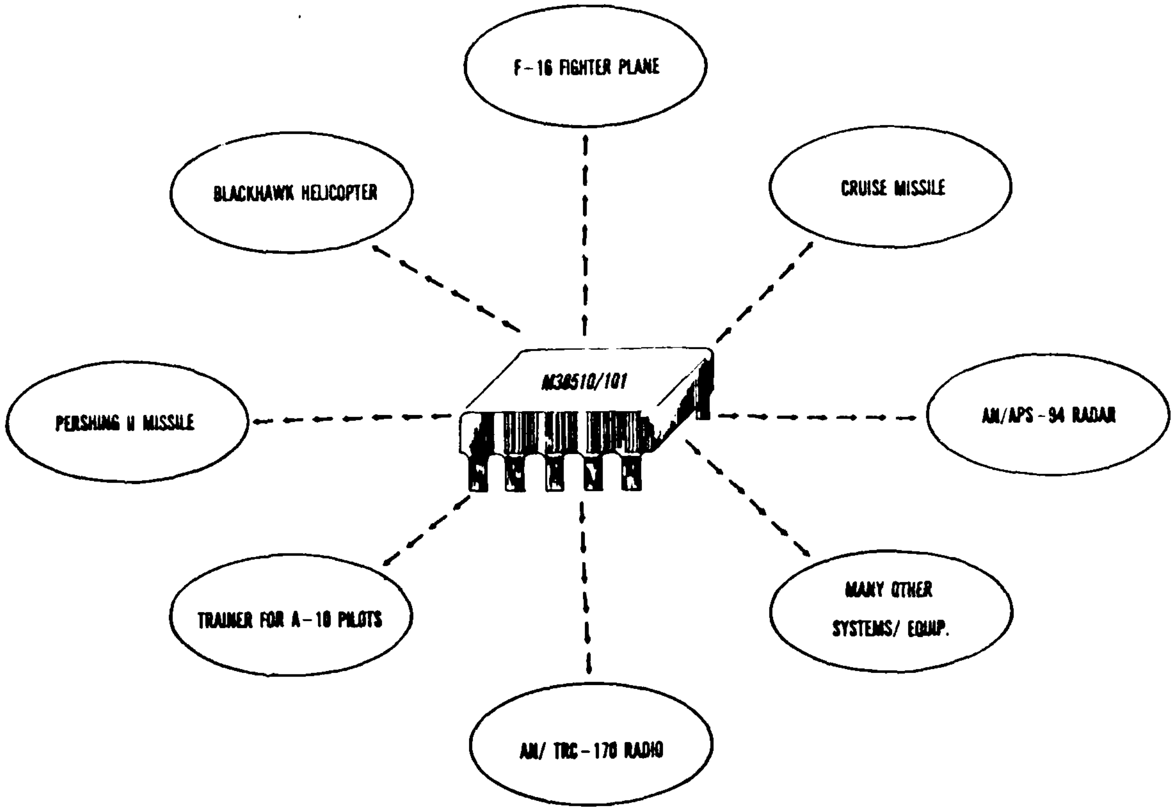
ENTRY OF ONE ITEM (NSN ASSIGNMENT)	=	$ 207
NSN MGT FOR 10 YRS @ $ 165 / YR	=	1650
TOTAL COST OF EACH NEW NONSTANDARD PART	=	$1857

COST OF INCREASED MAINTENANCE

EST. COST OF EACH MAINTENANCE ACTION $ 300

ASSUME A NONSTANDARD PART WILL CAUSE AT LEAST ONE MAINTENANCE ACTION PER YEAR OVER THE TEN YEAR LIFE OF THE EQUIPMENT **X 10**

TOTAL INCREASED MAINTENANCE COSTS $ 3,000



★ EXAMPLE OF STANDARDIZATION BENEFIT

LESSONS LEARNED

PART TYPE: MIL-M-38510/101 MICROCIRCUIT, LINEAR OP AMP

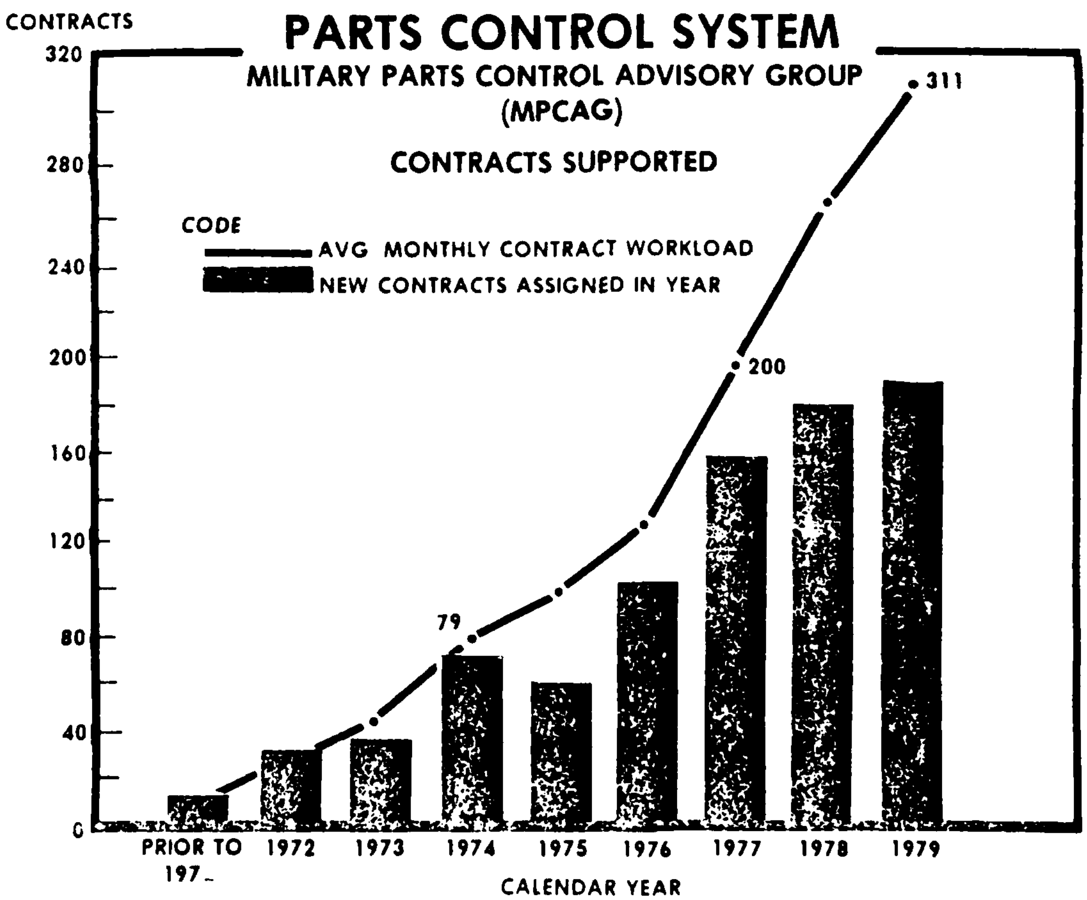
- **NONSTANDARD TYPES REPLACED SINCE 1973 – 491 REPLACEMENTS**
- **USED ON 125 CONTRACTS (ARMY - 18) (NAVY - 29) (AF - 78)**

BENEFIT	COST
DRAWINGS AVOIDED	SPEC PREPARATION
TESTS AVOIDED	SPEC MAINTENANCE
NSN'S PREVENTED	QPL MAINTENANCE
NSN'S REPLACED	NEW NSN'S
MAINTENANCE ACTIONS AVOIDED	PART EVALUATIONS
	ITEM REDUCTION
TOTAL: $6,349,612	TOTAL: $61,641

BENEFIT TO COST 103 TO 1

GROWTH OF PARTS CONTROL PROGRAM

FISCAL YEAR	TOTAL CONTRACTS SUPPORTED	LIFE CYCLE COST AVOIDANCE $MILLIONS	MPCAG COST $ MILLIONS	BENEFIT/COST
1973	57	$ 40	$ .67	58:1
1974	97	53	.77	68:1
1975	142	84	.83	101:1
1976	184	114	.84	136:1
197T & 1977	290	127	1.35	94:1
1978	396	134	1.60	83:1
1979	460	127	1.40	89:1



" THE BITTERNESS OF POOR QUALITY IS LONG REMEMBERED AFTER THE SWEETNESS OF LOW PRICE IS FORGOTTEN "

A WISE MAN

TECHNICAL DATA ACQUISITION MANAGEMENT

by

Leland K. Womack
U.S. Army Missile Command

Management of the acquisition of technical data is a controversial and complex subject that covers a spectrum of disciplines. However, there are three areas of this subject--application of specifications, preparation of specifications, and communication--that I believe are most important. The attention given to technical data in the past few years has resulted in improvements. Further improvements will be the result of personal commitment by both Government and Industry to "build a better mousetrap."

A complete discussion of technical data acquisition management would take several symposiums and result in many heated discussions. Since the principle focus of this meeting is on the methods of acquiring technical data, I will address three broad areas in order to stimulate some of you into participating in building a better mousetrap. I only hope that Florida Senator Lawton Chiles' remark, "If you build a better mousetrap, don't try to sell it to the Federal Government," is not appropriate to the outcome of this meeting. I believe that the Government can improve technical data acquisitions by more carefully applying specifications, preparing the specifications to aid in selecting minimum program requirements, and communicating with Industry on a better mousetrap. Industry can assist by recommending other methods and less stringent requirements in order to obtain the desired Government end result. In fact, significant improvements will occur if Industry will utilize their customary methods and educate the procuring activity or the individual imposing the requirement as to how and why this will meet the needs of the Government. All too many times, in the heat of competition, Industry will not express their better mousetrap but will simply state that they will comply. My purpose today is to discuss a few ideas on how to improve technical data acquisition management.

In the past few years, many actions have been taken to improve the environment of DoD acquisitions. Figure 1 highlights only a few of these actions. As can be seen in this figure, the introduction of new and revised military specifications and government directives forms the groundwork but the human factor is still with us. The ADPA and other industry associations--through workshops, meetings, and symposiums--are working to change the human factor--attitude. This change in attitude must take place in both Government and Industry.

Dr. Joseph F. Shea, Chairman of the Defense Science Board Task Force Study on Specifications and Standards, told us that we are not good managers when he stated, "In almost every case, reading the document revealed that it contained much more flexibility than appears to be used in practice. The excessive cost resulted from a failure to utilize this flexibility in a reasonable way, rather than from a fundamental problem with the specification itself." Dr. Shea's group was primarily concerned with nonproduct type requirement documents, whereas Senator Chiles' remark was directed to the product type.

Now, Dr. Shea is politely saying that we who are involved in technical data preparation and systems acquisition management are like Dorothy's friends in the land of Oz. I am sure you remember Dorothy's friends--combined, they had no heart, brain, or courage.

There can be no doubt that management improvements can be made in the technical data acquisition process--but the heart to set aside parochial interests, the brains to arrive at reasonable solutions, and the courage to continue in the face of adversity must be with those in both Industry and Government who are involved in technical data acquisition. It is much easier to continue our same old ways than teach an old dog new tricks. But new ways got us to where we are today and will continue to move us forward.

Now, why do we need to change? Dr. Shea's group basically stated that there is nothing wrong with our specifications and standards--the basic problem exists in how they are contractually applied. As a result of this study group's report, the buzz word for each day is "tailoring." Tailoring, in the context of defense acquisition, is the wrong term. To me, tailoring means that you can increase or decrease requirements from the standard, as required, to suit the need. Figure 2 shows the DoD D4120-21 definition for tailoring. I do not see anything in this definition to cause me to change my mind. The draft revision of this directive changes the wording but still falls short. Figure 3 shows what I believe we are trying to state in the directive and that this must be our goal. Using this statement means that only those requirements in the source document will be contractually invoked. Carefully preparing specifications will preclude the need for imposing requirements outside of the specification.

In order to select requirements from a specification, careful preparation of the source document is required and the manager making the selection must have the fortitude to select only the minimum requirements. It may take this manager several meetings with a requiring element in order to determine what the minimum requirements are. This manager must not be concerned about asking "dumb" questions. It is by asking these questions that he can understand the requirements better and be able to make reasonable decisions. Many times the selection of excessive requirements is due to a lack of understanding of just what is really required when pressure is applied by a requiring element or an individual.

Senator Chiles' remark was made after he had reviewed the Government's requirements for mousetraps and found that the supplier would have to comply with approximately 500 pages of specifications. Requirements such as these are indicative of what has happened in weapon system acquisitions. Tiering of documents through referencing got out of hand, and DoD had to clarify the applications of reference documents. Our specifications invoked on development programs are not all prepared so that the selection of requirements is an easy task. In some cases where care was taken to aid in the selection, the basic intent of the specification or standard is easily subverted. For example, DoD-D-1000 was revised a few years back in order to drop various categories and forms of drawings. The intent of the revision was to show an orderly progression through three levels of drawings from design concepts to production. Most people understand level 1 (conceptual and developmental design) and level 3 (production), but those level 2 drawings (production prototype and limited production) cause more arguments in any one day than the Supreme Court hears in a year. Everyone seems to have their own opinion as to just what level 2 drawings are. For awhile I thought I understood what they were--but, now, I just don't know. Figure 4 shows a few statements that have been made about level 2 drawings.

Now, the point I want to make here is that the "Ordering Data" paragraph of DoD-D-1000 allows the same requirements for levels 2 and 3 to be selected. Both Government and Industry have spent a lot of time on preparing and reviewing this specification; however, it simply is not clear as to what the difference between these levels is.

Back some time ago, I reviewed a contractor's proposal for drawings. These drawings were to be prepared to meet level 2 requirements, with an option to obtain level 3. This contractor stated in the quote that no conversion requirements for the level 2 drawings were necessary as they would meet level 3 requirements. I wish I could say that I was surprised. If the contractor had provided a writeup on how he would convert the level 2 to level 3, I would have been surprised.

If it is true that there are many who are confused with level 2 versus level 3 as I think there are, we need to eliminate this confusion in the next revision. One method that could be utilized to accomplish this would be by changing level 2 drawings to be those prepared according to the contractor's drawing practices. This means that of the 21 procurement requirements in DoD-D-1000, only 9 would apply to level 2 drawings. Four of these apply to the drawing requirements and five to reproductions and delivery. The only way that we can currently procure contractor drawings is to state in Block 16 of the DD Form 1423 that the drawings are to be contractor drawings prepared in the contractor's format. It appears that this meets the real intent of DoD-D-1000, as shown in Figure 5. I wonder if the real intent of level 2 is to procure contractor drawings for production when there are no plans to procure from another contractor. Also, it appears that it would be simple to buy level 2 drawings for items to be procured from the developing contractor and level 3 drawings for items to be procured competitively.

Earlier I mentioned the preparation of specifications. Dr. Shea said, "Major payoff for improvement in specifications and standards will come initially in their method of application, followed by longer range improvements in content." I fully agree with this statement. If the specification is not properly prepared, several things could occur--misapplication, over application, the excessive referencing of documents, and selection of the wrong alternative and Murphy's law will prove it. All this simply says is that to aid in improving specification application--thus improving acquisition programs--we must do a better job of preparing specifications.

Proper specification preparation is no easy task. Again, that human element enters into the picture. When the specification covers alternative ways, a procuring activity will still probably order greater requirements than necessary because they feel safer.

I think the previous remarks concerning DoD-D-1000 explain why unnecessary requirements enter into contract instruments. Usually level 3 requirements are imposed; when level 2 are stated, they are imposed so that no difference in the two levels will occur.

That thing we do more of than anything else--communicate--is probably what we do the poorest job of. We simply do not know how to transmit or receive expressions of requirements or how to respond to someone so that they understand our response. I believe that the most improvement in technical data management will come from better communications than anything else. Directives, regulations, and guideline documents will accomplish little unless Government and Industry are able to relate.

Industry does business with all services and, as a result, must devise a "middle-of-the-road" approach to the requirements. They standardize a method that is flexible in order to meet the different requirements imposed. In most cases, the Industry's method will meet our needs; but, Industry must do a superb job of relating their method in order to insure a better understanding. It should not be this way, but attitudes toward change or a better mousetrap sometime interfere with progress.

In summary, let me discuss two documents--MIL-STD-961 and MIL-STD-490. At an ADPA meeting in Washington during June 1973, recommendations were made to resolve the differences between these specifications. The attendees departed the meeting thinking there was agreement among the proponents of the two documents. The minutes of that meeting included resolutions to the most insignificant detail of the two documents in an effort to standardize. Now, 7 years later, these differences still exist.

An attempt was made in late 1978 and in 1979 to combine these documents. Efforts in the three areas that I chose to discuss failed. It was a poorly drafted document--too many parochial interests were included.

Many of you would not believe the comments on the documents. Many of these comments were related to changing current regulations and service peculiar implementing documents. I expected Industry to be opposed to combining the documents, since converting program peculiar to military specifications would hit them in their pocketbook. However, most of Industry is in favor of this concept if the combination is properly prepared for the selection of requirements and provides the specification writer with easy-to-follow instructions.

Several discussions were held with the Army DePSO, John Kicak, and Don Mitchell, of DMSSO on combining MIL-STD-961 and MIL-STD-490. I am pleased to inform you that this project is not dead. In a few months you will again be asked to review a draft. I hope that you will find this draft truly a better mousetrap. If we believe Senator Chiles' remark about selling mousetraps to the Federal Government, no effort should be expended on this draft. Remember, when you are learning to walk, take one little step at a time--and someday you will run.

MIL-D-1000	Revised
MIL-STD-100	Revised
MIL-STD-961	Published
DSM 4120.3M	Revised
MIL-STD-965	Published
DoD D 4120.21	Published
OMB Circular A-109	Published
DOD D 5000.1	Published

Figure 1. DoD actions in technical data acquisition management.

The process by which the individual requirements (sections, paragraphs, or sentences) of the selected specifications and standards are evaluated to determine the extent to which each requirement is most suitable for a specific materiel acquisition and the modification of these requirements, where necessary, to assure that each tailored document invoked states only the minimum needs of the Government.

Figure 2. Tailoring.

The orderly process of reviewing and selecting from the total realm of available specifications and standards those that are considered to have application to the particular materiel acquisition program and only contractually invoking the individual requirements (sections, paragraphs, sentences) stated therein to assure that each requirement invoked states the minimum needs of the Government at the most advantageous status point in the system development cycle.

Figure 3. Application of requirements.

- Level 2 drawings referenced company standards but level 3 do not.

- Level 2 drawings contain the QA provisions at a higher assembly level than level 3.

- Only the prime contractor can produce to level 2 drawings.

- Level 2 drawings are freehand whereas level 3 are mechanically lettered.

- Anything between level 1 and level 3.

Figure 4. Remarks on level 2 drawings.

NOTE: In special circumstances and in unusual programs where usable engineering drawings need not meet the above requirements (Level 2 only), or the predicated end-use of required engineering drawings does not include a projected need for follow-on competitive procurement of the design item(s), Government organizational elements responsible for the determination of ordering Level(s) and use of engineering drawings are directed to the content of paragraphs 6.1, 6.1.1, and 6.2.1.

Figure 5. Special note for processing contractor drawings.

UPGRADING ENGINEERING DATA STANDARDIZATION

By

Frank W. James

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Engineering Data Branch (AFLC/LOLME)
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SUMMARY

Engineering data management has begun to rely increasingly on computer-aided design, manufacturing, -assisted retrieval and-input/output microfilm (CAD/CAM/CAR/CIM and COM) systems. Digitized formats do not easily translate into pre-automated era (hand drawn) formats. Mathematic models are prepared differently than for manually prepared drawings. Non-automated and automated engineering data systems support todays complex weapon systems. There is an effort to catch-up with existing engineering data automation technology available as off-the-shelf systems. Research and development (R&D) efforts of automated systems are slowing as efforts are made to have marketable technology confirmed in actual (rather than projected) sales.

Management tracking of engineering and manufacturing requires a commitment to translate data into discernable documentation. This kind of documentation should be complete enough to allow duplicating and modifying out-of-production items. The challenge of standardization is cooperatively being met by Federal Government agencies and industry's standards associations. One such cooperative effort is represented by the National Micrographics Association's (NMA's) C25 Committee on Department of Defense (DOD) Specifications and Standards.

INTRODUCTION

The DOD established many years ago an audit and retrieval trail for engineering data. It is a management system for engineering data. The system's specification and standards are in two Federal Supply Codes (FSCs) area assignments. The engineering data system assignment areas are the DOD Drawing Practices (DRPR) and Data Microreproduction System (EDMS). The DRPR addresses the preparation requirements for engineering data, the "language to be used and the translation of such data. The EDMS concerns the storage and retrieval of engineering data. In this age of technology, these two FSCs are not enough to form a complete engineering audit trail. Additional support is furnished by the Defense Documentation Center (DDC) and the Government-Industry Data Exchange Program (GIDEP). DDC and GIDEP are separate subjects from what will be addressed here, but are mentioned to complete the concept of Federal documentation of engineering. Only the audit trail that addresses engineering data (drawing/microreproduction) standardization, namely DRPR and EDMS will be discussed. A model of cooperation between industry and DOD standardization will be cited as an example to be emulated by industry associations. Benefits and problems associated with such cooperation between industry, DOD and associations will be discussed.

DISCUSSION

1. ENGINEERING DRAWINGS USE A LANGUAGE:

a. An engineering drawing format is a written language; its hieroglyphics communicate form, fit and function or logic. The language is rooted in antiguity, yet very much alive. A living language is subject to change. A dynamic change is usually caused by a phenomenon having major social impact. Computer integrated systems are having such an impact. This has caused a change in drafting practices. (The machine and drafting language impact is much like the merging into English after the Norman-French conquest of 1066 over the Anglo-Saxon people). The vocabulary used in the drafter's language will be expanded in the Eighties to include machine/automation terms.

(1) An example exists in numerical control (NC) drawings. It used to be enough to show the part with X, Y, and Z coordinates. Today, one should identify what "octant" (if just X and Y are given, what "quadrant") space the raw stock is located; the distance from the starting point of the cuttinghead; stating if the starting point is a center, inside or outside position on the cuttinghead path; map of cutting path, location of stops and heights of cuttingheads long the pathline; identification of jigs and type of tools; and the "make and model" of the NC equipment used. Drawing of the part need not be shown, but if shown, part can be draw in using phantom lines. The resulting computer plot or output is a NC verification drawing. The change in hieroglyphics becomes apparent. We become interested in a "cutting path" rather than just the "part configuration."

(2) Using the computer to aid engineering, the drafter develops a mathematical model (it is not a drawing) for output using a plotter or COM or a variety of other outputs, i.e. engineering report list, router verification, photomask, NC tape, machine tool-up requirement, etc. Even the plot can have a variety of looks. The mathematical model can produce lines matched to scale that are mercator, cylindrical, polar, azimuthally, steroscopic, akonometic, orthographic or perspective projected. The "model" is more effective than a drawing in today's engineering communication environment.

b. Most engineering data managers (specialists) find themselves without the knowledge or tools to deal with these new merging languages. We still request drawings, for example, not mathematical models. We still have microfilm of drawings for our archives rather than magnetic records of models. We insist on getting the data in the wrong media. This causes the organizations we work for a lot of unnecessary re-engineering during modifications, self-help efforts and/or re-acquisitions. We just do not have the specifications and standards to tell others (e.g. purchase officers) what is needed.

2. CONSECUTIVE BINARY DIGITS DO NOT COMMUNICATE WITH PEOPLE:

a. The problem of human interface has been constant from the very start of computer technology. The computer user and vendor have created sub-languages to the binary digit codes to aid programmers and machines to "talk" together. Software

couplers allow the use of program languages like Automatically Programmed Tool (APT), Abbreviated Test Language for All Systems (ATLAS), Program Language One (PL/1), COmmon Business Oriented Language (COBOL), FORmula TRANslator (FORTRAN) and BASIC in manufacturing, business, science and engineering. The addition of the cathode-ray tube (CRT), the digitizing tablet and the output plotter or output microfilm added peripherals to central-processing units (CPU) caused birth of the computer-graphics industry. Now we have computer-aided design (CAD), computer-aided manufacturing (CAM), computer-input/output microfilm (CIM/COM), computer-assisted retrieval (CAR) and the microform-fascimile transmission (MFT) systems to aid in the automation of engineering data management. This is an exciting "age" as we learn to "live with" available technology in the field of engineering data and to take fuller advantage of automation.

b. The significance of a row of zeroes (off) and ones (on) are not communicated to people. The conversion of binary to decimal digits help. Looking at columns of numbers sometimes blankout the mind from seeing an "overview" of computer crunched numbers. The input to our minds are through touch, smell, taste, sound and sight. Data is known to be translated to the mind when people say such things as, "I see that," "It's as clear as day to me," "See, right here it shows," or, "I get the picture." Such expressions tell others that translation has been made.

c. The birth of computer graphics has made it possible to speed cybernetics to giving a "picture" of data. I do not mean that the picture must be a graph or drawing, it can be in the form of human language (a set of symbols for sounds or hieroglyphics for ideas/concepts). The baseline is that engineers, architects, scientists, technicians, drafters, builders, manufacturers and archivalists have a new tool, automated data production using computer graphics. There is not one area in our technological society that has avoided this automation. While machines can talk to machines in strings of binary digits, it is computer graphics that provide <u>effective</u> translations to the "profound" human. Computer graphics give people and <u>organizations</u> a rapid communication link with machines. The name given this phenomenon is "interactive."

3. <u>PROBLEM, REAL OR JUST SCARY</u>?

a. People become frighten because they have emotions. Machines are todays realities but they do not think nor do they have emotions. Both function. People who cannot swim for example, are frightened of deep water. In a like manner, one must learn to use the computer before the perceived fear will be replaced with confidence. It's the same kind of thing that happens when people become confident swimmers. When talking about computer technology impacting on engineering data management, I remain confident that people will learn to compute. A good coach/instructor does not push non-swimmers into deep water and say "sink or swim." A lot of computer vendors, wanting to make their R&D efforts pay back, are pushing novices in over their heads rather than easing into the "shallow waters" of computer technology first.

b. We in DOD have an image of ourselves. We think of ourselves as leaders and users of technology. In the area of engineering data management, we find ourselves in a catch-up situation with available off-the-shelf technology with would-be-users waiting in the "wings" for government to take the lead. The historical fact is that the DOD did develop the assigned areas DRPR and EDMS specifications, standards and handbooks.

The fact is that through manpower restraints and force attrition we have lost most of our corporate memory. This does not remove us from our role as relates to DRPR and EDMS. We must simply find other ways to continue our leadership.

c. Engineering data prepared under DOD contracts by industry to support manufacturing of weapon systems and components are accomplished using automated drafting techniques. Such drawings are matched to manufacturing methods which have also been automated. This ideal data furnished the DOD should be adequate to remanufacture or redesign parts or systems at some later unspecified date. The DOD has long accepted the reality that, even with the best of data, some re-engineering will be required to support re-acquisition. The data should allow a "restart" of production. While these aims may be too optimistic, the microfilmed engineering data is starting to fall far short of an acceptable goal. This is largely due to lost or misunderstanding of requirements in DOD specifications and standards, Defense Acquisition Regulation (DAR) and Data Item Description (DID) identified in the Statement of Work (SOW). The data requested and received usually does not allow "re-tooling" of automated production. The DOD request is for the kinds of tradition data required before automation became common-place.

4. SOME EXAMPLES:

a. The Lockheed Corporation no longer manufactures the F-104. The aircraft is still flown. In a self-help effort, the Air Force started to numerical-control (NC) manufacture parts no longer in production at Lockheed. Besides missing dimensions, some very critical information was missing. A study by the Metcut Research Associates Incorporated of Cincinnati, Ohio, states that "all manufacturing data, whether conventional or NC, should be documented for a part when it is planned. This information includes: "sequence of manufacturing operations, machine tool(s) planned for each operation, machine tool(s) used for each operation, cutting tools planned for each operation, cutting tools used for each operation (with comments), fixtures planned for each operation, fixtures used for each operation (with comments), feeds and speeds planned for each operation, feeds and speeds used for each operation (with comments), and NC tape number for each operation." The DOD has never asked for this kind of data and I am not sure that it should. However, the furnished engineering data under contracts need to support very different engineering/manufacturing information than just drawings and lists. The F-104 experience has shown the reality for the need of more NC data than is now required of "prime" contractors.

b. In the case of the F-15 of McDonnell-Douglas and the A-10 of Fairchild, automation was used in engineering planning and production. A multimillion dollar effort "corrected" the data to acquire portions of needed documentation. The Air Force did not control the use of proprietary items, processes or materials prior to these systems production stages and it failed to determine the technical adequacy and accuracy of engineering data prior to the Government's acceptance of the microfilm. Much of this data is that which supports embedded computers and NC manufacturing.

c. The engineering data contract with General Dynamics (GD) on the F-16 has "deferred delivery" clause. This weapon system is of added importance because of its involvement in the Department of Defense Foreign Military Sales (FMS) program. The "prime" contractor has an "open door" to format data in accordance with GDs drafting room manual. A basic ordering agreement (BOA) is used, to obtain as needed, until the engineering data is delivered to the Air Force.

d. The Army's new XM1-Tank has many of the same problems with Chrysler's furnished engineering data. In addition, nearly all the microfilm data is from line-plotted drawings inked on vellum. This method is being used to meet the present requirements of MIL-M-9868. This specification is being changed to allow employment of computer-output microfilm (COM) engineering data. But the problem goes beyond the use of plotters and COMs. The XM1's "heart" is its on-board computers. The engineering data should allow re-manufacturing of microchips and future "reverse" engineering of NC produced parts. The format to "produce" the tank is not the format required to meet DOD engineering data specifications. The Army may have overrun costs related to data, just as the AF experienced, and that data may be furnished incomplete because the "right" format was not specified.

5. AF PLANS:

a. Plans include efforts to direct attention of the EDMS away from data dependency on 35mm aperture cards to wider use of other microform products. This is to allow better utilization of CAR systems to store much more data than required to be furnished by weapon system (prime) contractures. This change will also effect the FSC DRPR area.

b. The Air Force is developing two new major weapon systems, the MX and the C-X, and has other systems still in acquisition. The AF, for these systems, must develop some sound concepts regarding engineering data automation. A lack of background or position paper will be ready by the end of 1980 that will aid in establishing AF policy. Hopefully such an AF policy will aid adoption of like positions by all DOD activities. Work has also started on revisions of MIL-M-9868, MIL-D-5480, MIL-HDBK-303.

c. The Air Force Logistics Command (AFLC) is preparing activity (PA) for these documents. As the Air Force is the Lead Service for EDMS, the Army is the lead for the DRPR (contact point: Maurice E. Taylor, US Army Armament Research and Development Command, Dover, New Jersey, 07801). Both Lead Services are developing DOD Standardization Program Plans (SPP) to address some of the dialogue discussed here.

6. NATIONAL MICROGRAPHICS ASSOCIATION (NMA) AIDS THE DOD:

a. "In the interest of economical government acquisition and to facilitate the adequate and proper description of certain commercial products available to the government from the micrographic industry, arrangements have been made to hold an information and organization meeting at headquarters office of the NMA." This line from the NMA 8 January 1979 letter to the AFLC was the start of what has become known as the C25 Committee. The NMA Committee first met in 1979 and developed the scope: "Identify and recommend both the adoption of voluntary consensus standards to the DOD and the creation of needed industry standards to the NMA." Thus the NMA's DOD Specifications and Standards Committee was formed.

b. The C25 will aid the DOD's effort to adopt American National Standards Institute's (ANSI's) PH5 micrograph standards (and other related ANSI standards), as well as NMA's standards. This is in order that they may be cited, along with their dates of issuance and source of availability, in appropriate DOD publications, regulatory orders and related in-house documents. DOD participants are fully involved in discussions, technical debates and serve in official capacities on NMAs committees. The C25 is to focus on and encourage full participation with DOD EDMS custodian and preparing activity personnel. Guidance for this kind of cooperation is to be found in the Office of Management and Budget (OMB) Circular No. A-119, 17 January 1980.

c. The key to success is the development of the right laison between industry associations and the lead DOD agencies. Cooperation must be in the best interest of both. There is danger in compromise unless there remains a balance between three contributing groups on such a committee as the C25: (1) vendors who want the DOD to buy their products and to aid in underrighting their R&D, (2) the private and public user interest must be well represented to make sure that adopted recommendations are accomplished practically for the good of the society at large, (the guidance in OMB Circular No. A-119 requires public disclosures of all associations meetings when federal personnel participate), (3) the DOD specifications and standards preparing activities who want to protect the government from poor products and workmanship while maintaining comparative low costs. The association's executive or appointed representative and lead service officer must work together to strike a balance. Such a balance now exists on the C25.

d. It is through the C25 that the DOD is alerting industry of an expected change of format and type of engineering data being requested of contractors and the change of media for the archival quality storage of future data. We in the DOD need industry associations' assistance. The NMA is committed as a focal point for micrographics. They will aid in weeding out the impossible in order to achieve the practical. Suggestions should be addressed to the attention of the C25 committee, National Micrographics Association, 8719 Colesville Road, Silver Spring, Maryland 20910.

7. A LOOK INTO THE CRYSTAL BALL:

a. The cathode-ray tube (CRT) on computer-aided design (CAD) systems is not a A, B, C, D, E formated engineering drawing sheet (ANSI Y14.1). The CRT lends itself to a nearly square image area. There is no problem with this difference until one eliminates the requirements to deliver data on or microfilmed from standard drawing sheets. It makes little sense to utilize old drawing sheet requirements when COM can by-pass the use of plotters.

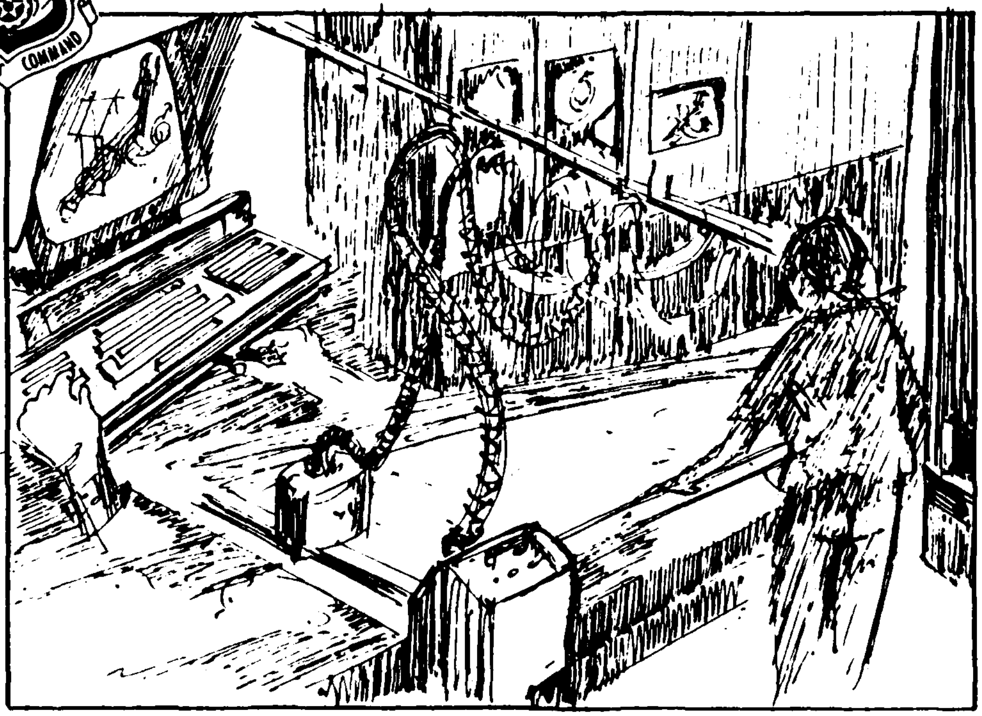
(1) A square boarder should be added around a complete CAD prepared mathematical model. The title block must be added to the inside corner of that square boarder. There really is no such thing as a revised drawing using automated drafting techniques, seeing that computer must "draw" fresh from the start of a program. A system needs to be developed to tell users to throw out or erase older images of outdated mathematics models. The revisions block (box) is not required on CAD plots.

UPGRADING ENGINEERING DATA STANDARDIZATION

BRIEFER: FRANK W. JAMES
DIRECTORATE OF LOGISTICS MANAGEMENT
ENGINEER DATA BRANCH (AFLC/LOLME)

HEADQUARTERS AIR FORCE LOGISTICS COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

CAD/CAM/CAR/COM/CIM SYSTEMS



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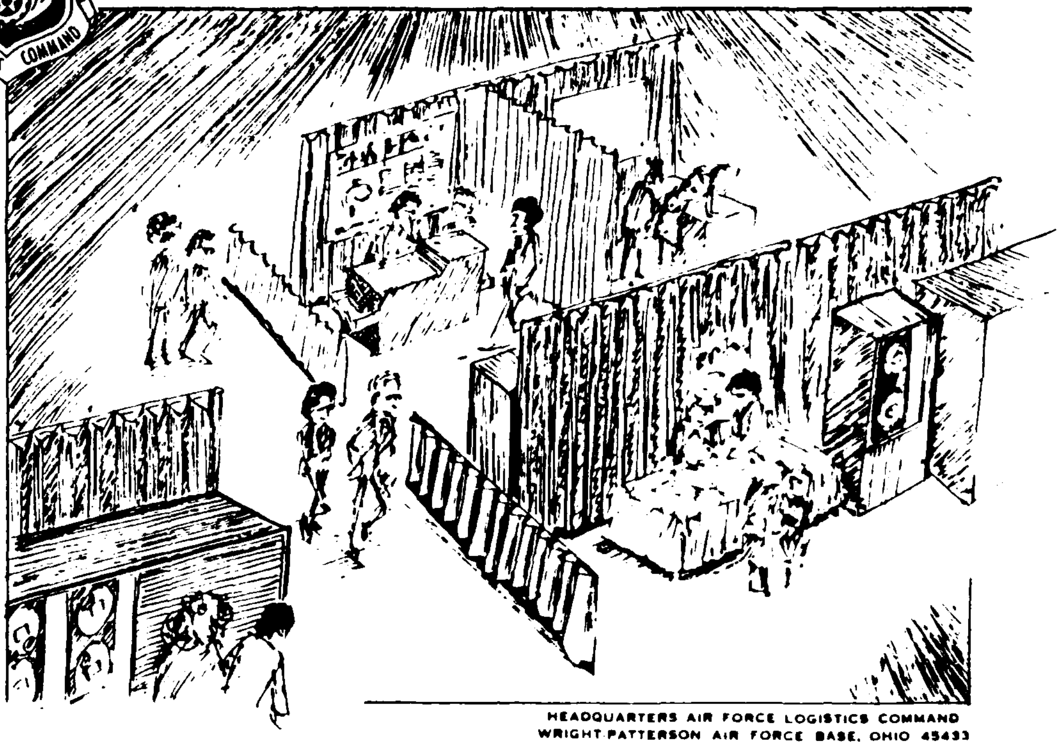
MARKETABLE TECHNOLOGY



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DRPR/EDMS

FEDERAL SUPPLY CODE (FSC)
AREA ASSIGNMENT

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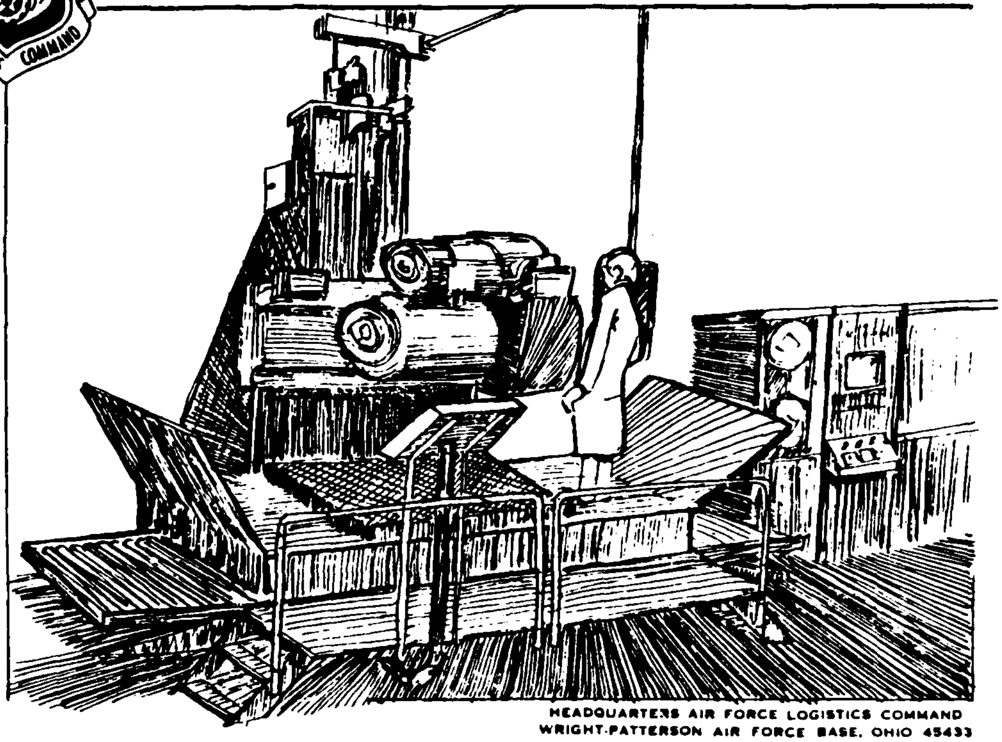
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

NUMERICAL - CONTROL (NC) DRAWINGS



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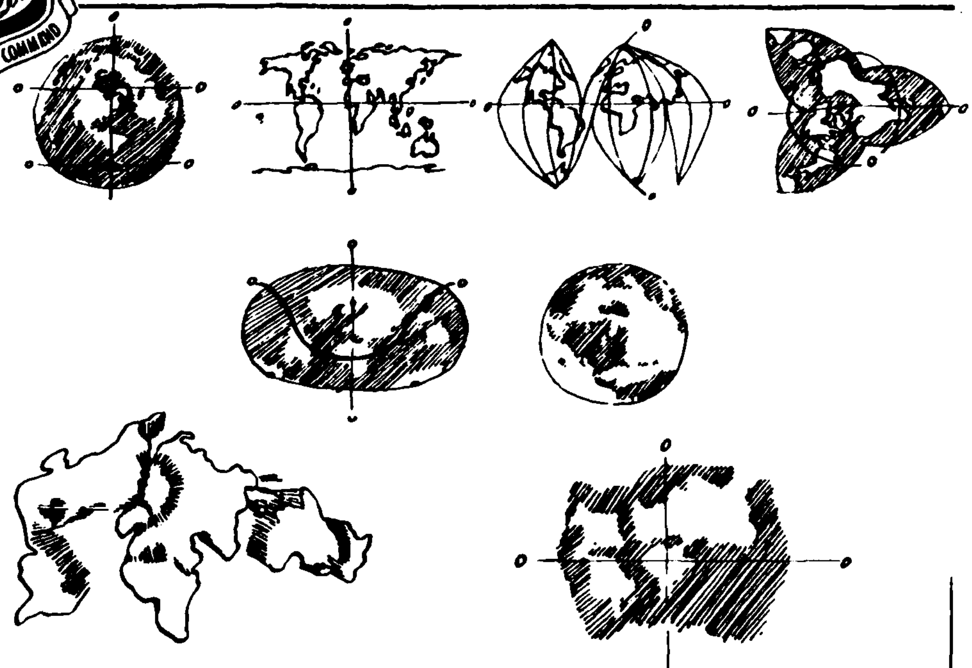
HOW DO YOU SEE THE WORLD ?



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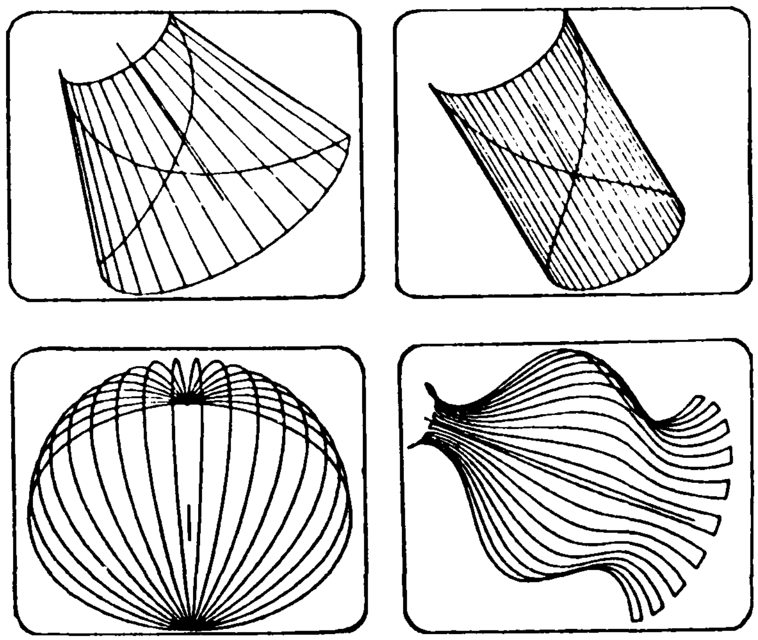
MATH MODELS - - NOT DRAWINGS



From the Gerber Scientific Instrument Company's Document 30602-S00-053A

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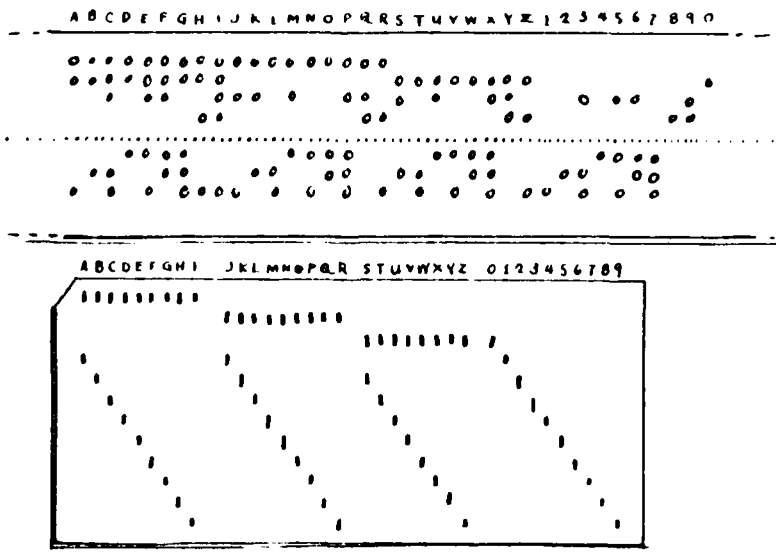
BINARY DIGITS DO NOT COMMUNICATE WITH PEOPLE



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WE HAVE A NEW TOOL - - COMPUTER GRAPHICS

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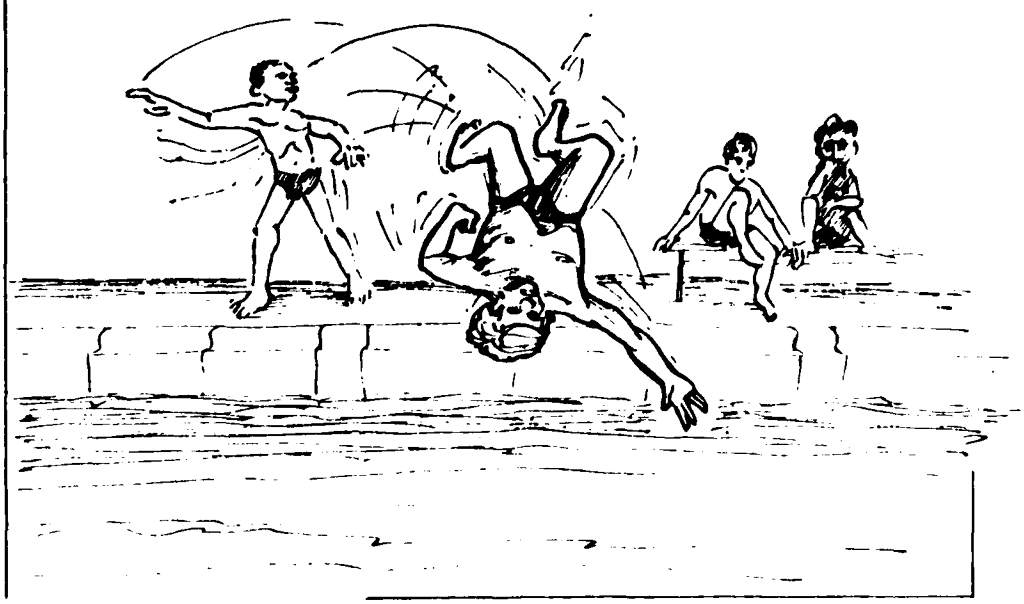
SINK - OR - SWIM MENTALITY



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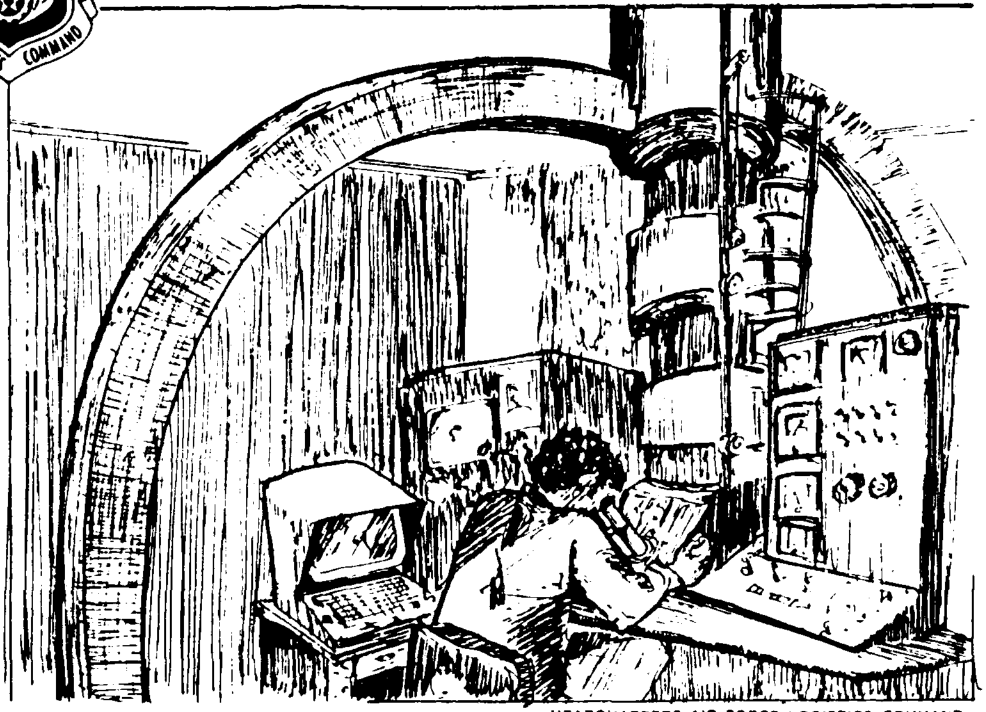
THE BEST OF DATA WILL REQUIRE SOME RE-ENGINEERING



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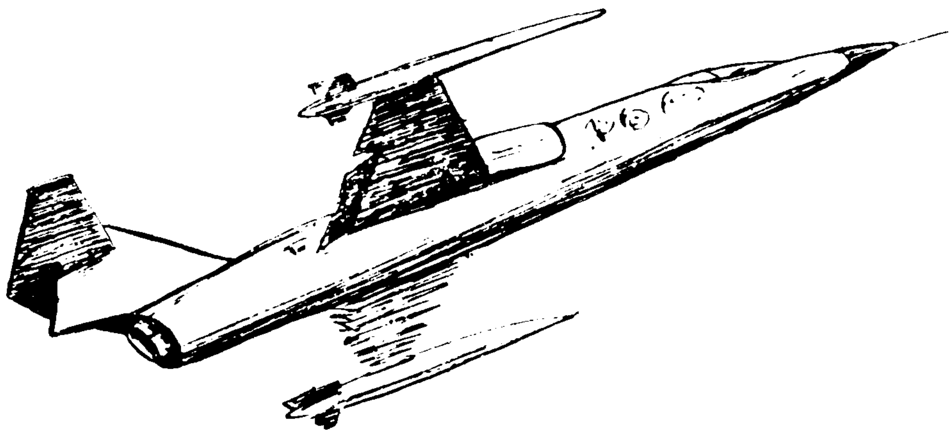
F - 104



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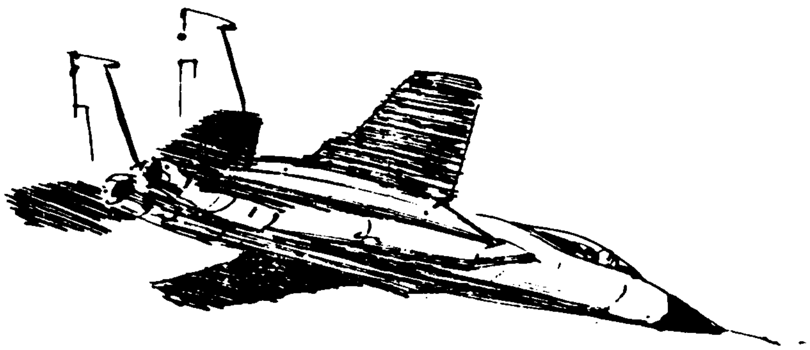
F - 15



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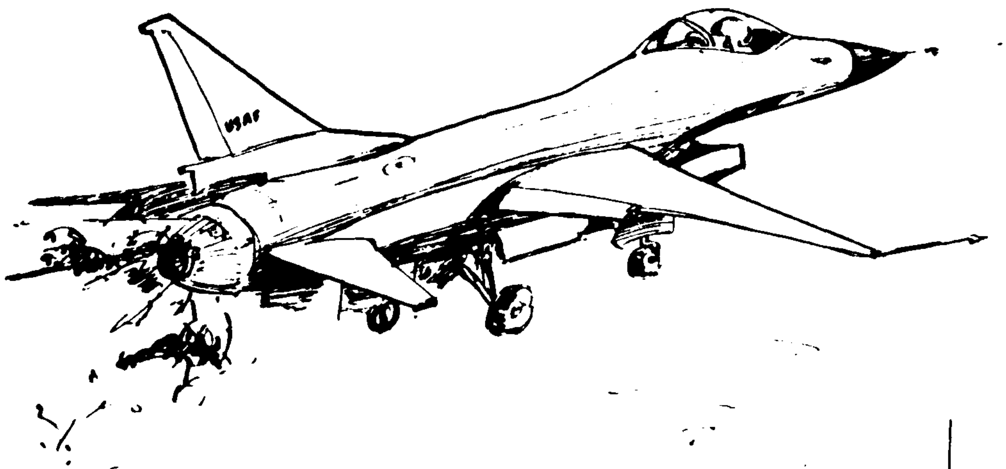
F - 16



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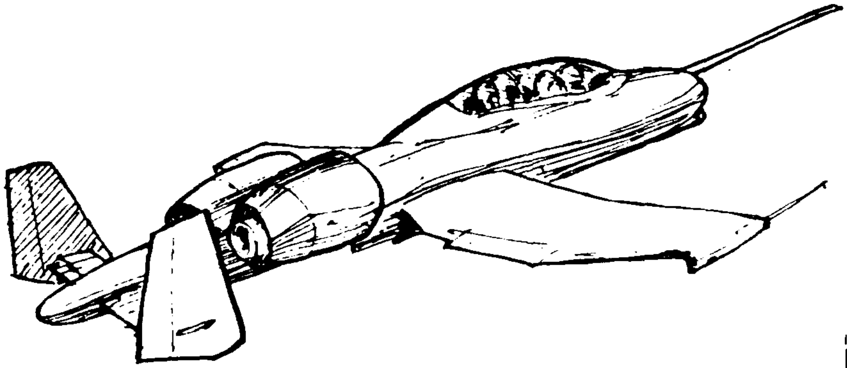
A - 10



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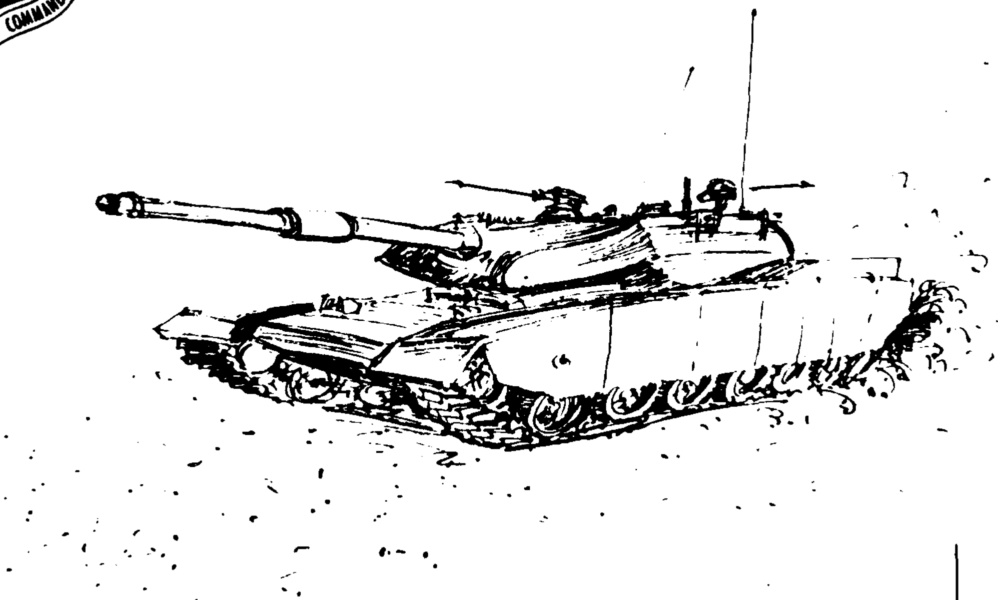
XM1 - TANK



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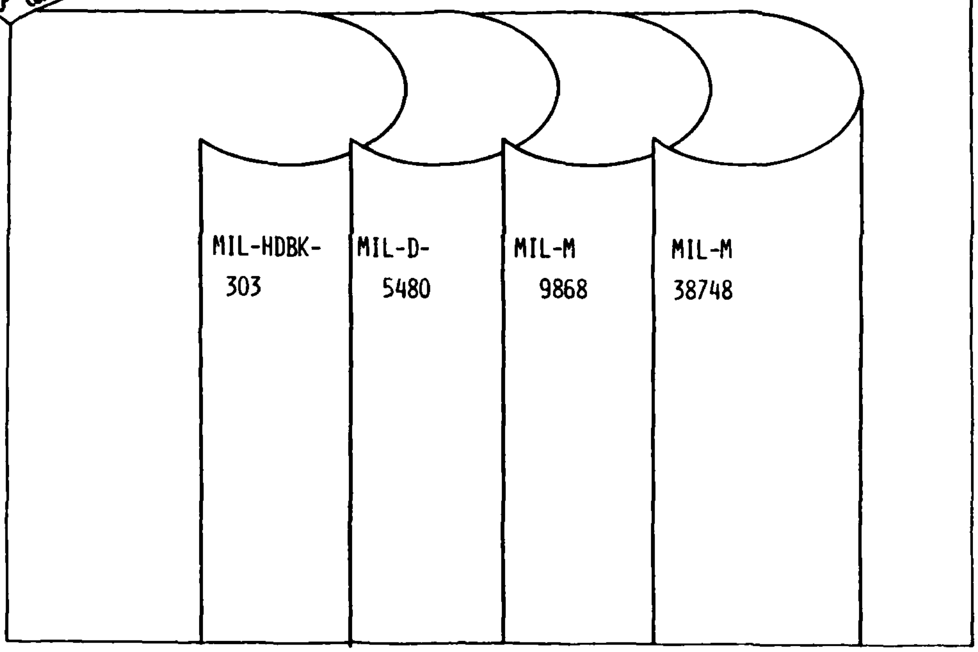
MILITARY STANDARDIZATION



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NATIONAL MICROGRAPHICS ASSOCIATION (NMA)

NMA'S C25
DOD SPECIFICATICATIONS AND
STANDARDS COMMITTEE.

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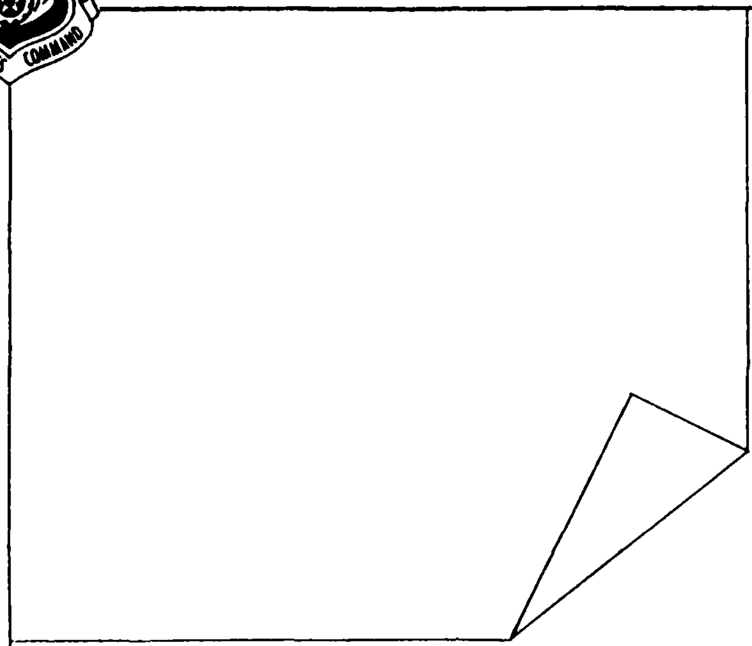
OMB CIRCULAR NO. A - 119



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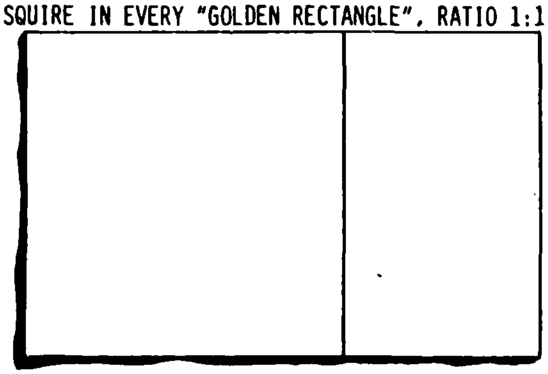
DRAWING SHEETS VS CRT DRAWINGS

THERE IS A SQUIRE IN EVERY "GOLDEN RECTANGLE", RATIO 1:1.618



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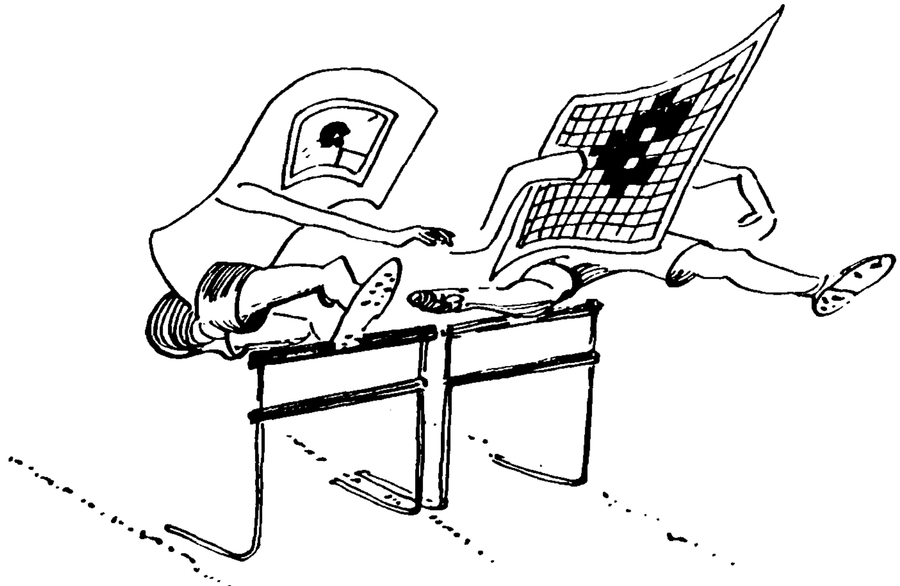
SWITCH FROM APERATURE CARDS TO MICROFICHE



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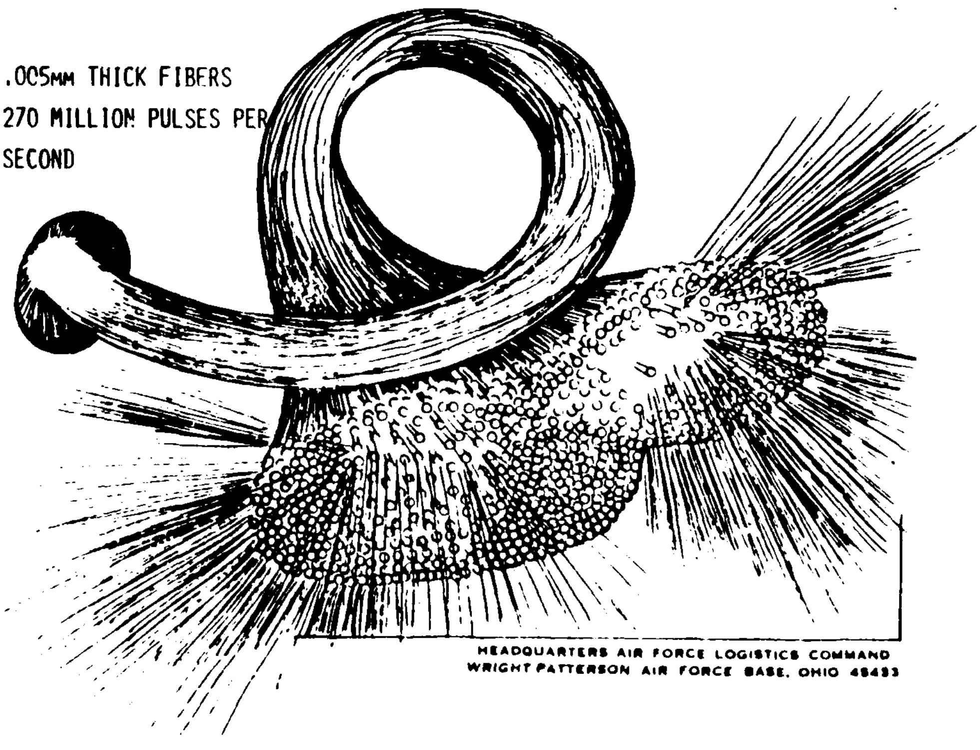
FIBER - OPTIC AND LASER TECHNOLOGIES

.005MM THICK FIBERS
270 MILLION PULSES PER
SECOND



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ASSISTANCE FROM INDUSTRY ASSOCIATIONS

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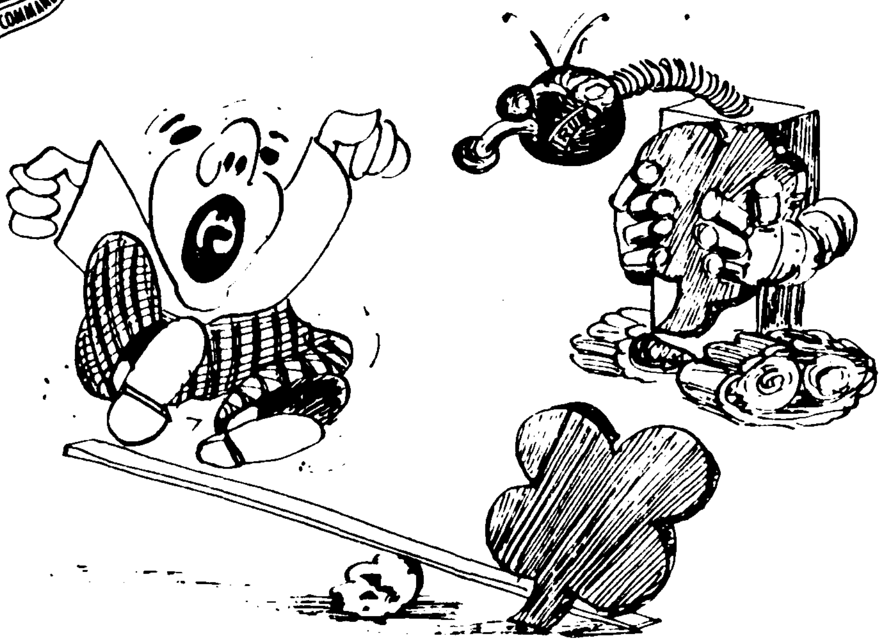
UTILIZATION OF AUTOMATION



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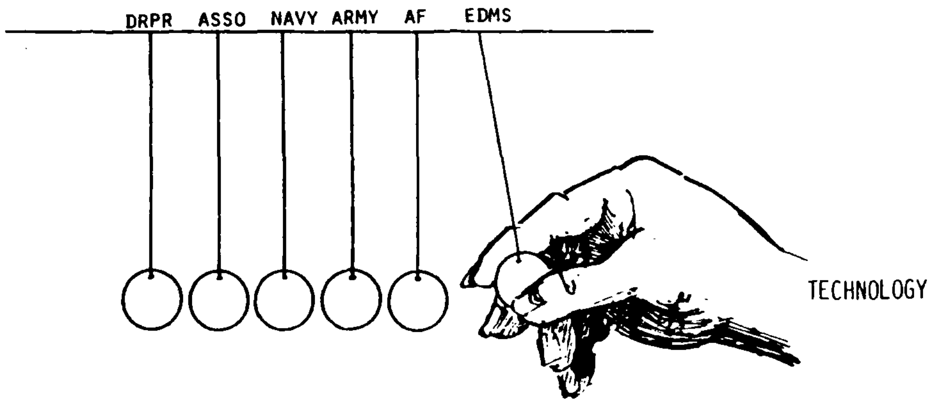
A NEW START FOR EDMS



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CONFIGURATION MANAGEMENT STANDARDIZATION PLAN

Major Philip C. Merkley (presenter)
USAF Systems Command and
Mr. Richard Berry (author)
Naval Material Command

8 MARCH 1978
UPDATE (5/80)

DEPARTMENT OF DEFENSE

CONFIGURATION MANAGEMENT STANDARDIZATION PROGRAM (CMAN) PLAN

OUTLINE

- BASIC PROBLEMS
- PURPOSE
- SCOPE
- PROCESS TO IMPLEMENT THE PLAN
- DCMC MEMBERS & CONSULTANTS
- OBJECTIVES
- MILESTONE SCHEDULE OF TASKS

BASIC PROBLEMS

- GUIDANCE FOR COST EFFECTIVE TAILORING AND APPLICATION FOR EACH PHASE OF THE LIFE CYCLE
- OVERLAPPING, CONFLICTING, OVERLY RESTRICTIVE & INADEQUATE REQUIREMENTS
- COMPREHENSION OF CM
- STANDARD CM TERMINOLOGY & DOCUMENTATION
- EFFECTIVE MANAGEMENT OF THE PROGRAM
- EFFECTIVE INTEGRATION OF CM WITH OTHER DISCIPLINES

PURPOSE

- PLAN
  - MANAGEMENT OF CM PROGRAM
- PROGRAM
  - STANDARDIZE THE CM DOCUMENTS
  - ELIMINATE NEED FOR LIMITED COORDINATED/SERVICE PECULIAR CM DOCUMENTS
  - PROVIDE BASIS FOR COST EFFECTIVE IMPLEMENTATION OF CM

SCOPE

- OVERALL ASSESSMENT OF CM DOCUMENTS:
    - REGULATIONS, INSTRUCTIONS, ETC
    - STANDARDS
    - SPECIFICATIONS
    - DIDs
    - DARs
- ASSIGNMENT OF TASKS & RESPONSIBILITIES
- PROVISIONS FOR TAILORING/APPLICATION
- PROVISIONS FOR MONITORING

PROCESS TO IMPLEMENT THE PLAN

- DMSSB/OUSD (R&E) TO APPROVE AND DIRECT (MEMO) THE IMPLEMENTATION OF THE PLAN (DMSSO MEMO OF 9 JUNE 1978)
- PROMULGATE THE PLAN (CNM LTR 0423/RLB OF 14 JULY 1978 & 28 JULY 1978)
- PREPARING/PARTICIPATING ACTIVITIES TO COMMENCE TASK REQUIREMENTS
- DCMC TO:
    - REVIEW PROGRESS
    - PROVIDE GUIDANCE
    - REVIEW/CONCUR PRODUCTS PRIOR TO FINAL APPROVAL/IMPLEMENTATI
    - IDENTIFY/REQUEST CORRECTIVE ACTION
    - PRESENT UNRESOLVED PROBLEMS TO DMSSO FOR RESOLUTION
    - REVIEW/UPDATE PLAN AS REQUIRED

DCMC MEMBERS

NAVY (CHAIR)	MR. RICHARD BERRY (MAT-042)
AIR FORCE	MAJOR PHILIP MERKLEY (AFSC-SDDS) (EXEC. AGENT FOR HQ USAF-LEYE)
ARMY	MR. JOHN BEACHBOARD (DRDME-DE) (ALTERNATE FOR DARCOM-DRCDE-RE) ARMY STAFF FOCAL POINT-DAMA-PPM)
MARINE CORPS	MR. JOHN DURANTE (MC-LMA)
DLA	MR. ELI LESSER (QES)
DNA	MAJOR HERMAN JONES, USA (LGSS)
DCA	MR. TED MALINOWSKI (513)
DIA	MR. A. J. JONES (RSE-3)
NSA	MR. HANK TREMPER (R43)

DCMC CONSULTANTS

DMSSO	MR. SAM P. MILLER
OJCS	LT COL JAMES CRABB (C3S-IOP)
NASA	MR. ERNST MOLLENBERG (OPE)
FAA	MR. SAMUEL ELLIOTT (AAF-740)

OBJECTIVES

• ACCOMPLISHED:

- PLAN APPROVED BY OUSD (R&E), 8 MAR 1978
- CMAN AREA ASSIGNMENT ESTABLISHED, 1 JAN 1977 (SD-1)
- DOD-STD-480A PUBLISHED, 12 APR 1978
- NOTICE 1 TO DOD-STD-480A (TAILORING APPENDIX) PUBLISHED, 29 DEC 1978
- NOTICE 2 TO MIL-STD-483(USAF) PUBLISHED, 21 MAR 1979
- DOD DIRECTIVE 5010.19 PUBLISHED 1 MAY 1979

• PLANNED:

- UPDATE JOINT CM REGULATION
- UPDATE CMAN PLAN
- IMPLEMENT REVISED PLAN

MILESTONE SCHEDULE FOR PRIMARY CONFIGURATION MANAGEMENT DOCUMENTS

TASK IDENT	PA	TITLE	CALENDAR YEARS											
			1979				1980				1981			
		Qtrs	1	2	3	4	1	2	3	4	1	2	3	4
CM-01	DDRE	DOD DIRECTIVE 5010.19, CONFIGURATION MANAGEMENT (Started 3/77)		A										
CM-02	NM	DOD CM STANDARDIZATION PROGRAM PLAN (Started 9/76 Completed 3/78)												
CM-03	DAR COMM	DAR REVIEW AND DEVELOP PROPOSED CHANGES (Started 8/77)										E		
CM-04	NM	DOD CM REGULATION (Started 1/78)								E				
CM-05	10	CM PRACTICES FOR DEFENSE MATERIAL ITEMS DOD-STD-XXX (Started 1/73)												E

S - START E - ESTIMATED COMPLETION A - ACTUAL COMPLETION

MILESTONE SCHEDULE FOR PRIMARY CONFIGURATION MANAGEMENT DOCUMENTS

TASK IDENT	PA	TITLE	CALENDAR YEARS											
			1980				1981				1982			
		Qtrs	1	2	3	4	1	2	3	4	1	2	3	4
CM-06	10	CM PRACTICES FOR SYSTEMS, EQUIPMENT, MUNITIONS AND COMPUTER PROGRAMS; MIL-STD-483 (Completed 3/79)												
CM-07	AR	CONTRACTOR CM PLANS, MIL-STD-1456							E					
CM-08	DAR COMM	DAR UPDATE									S			E
CM-09	NM	REVISE DOD CM STANDARDIZATION PROGRAM PLAN			S		E							
CI-01	MI	SPECIFICATIONS PREPARATION; MIL-STDs 490 AND 961 AND MIL-S-83490 (Started 6/77)		A										

S - START E - ESTIMATED COMPLETION A - ACTUAL COMPLETION

SESSION 4

Workshop Coordinator

MRS. LORNA BURNS
Hughes Aircraft Company

See sections S, T, and U for Session 4 workshop summaries.

SESSION 5

Chairman: MR. RICHARD R. BARTA
IBM Corporation, FSD

Secretary: MR. ROBERT A. TIMLIN
Martin Marietta Corporation

"CODING AND CLASSIFICATION OF PARTS AND DRAWINGS, THE KEY TO GROUP TECHNOLOGY"

By

Thomas D. O'Donnell
Standards Engineer
Pitney Bowes Inc
Stamford, Connecticut

SUMMARY

The coding and classification of parts and drawings is a standardization tool which permits automatic grouping and retrieval of the technical, financial and management data pertaining to parts, machine tools, process plans and other disciplines in the manufacturing industry. This grouping of parts and data is cost effective in that it increases productivity and efficiency in all departments and results in proven dollar savings each year after its implementation.

Coding and classification is a powerful tool. After parts are coded and their technical data are gathered into a computer database, the cost savings which may be realized are only limited by the imagination of the user and the variety of problems encountered in industry. New cost saving uses for the system are being discovered each year.

Pitney Bowes has been using a system of classifying and coding parts for retrieval, by design engineers, manufacturing personnel, and others, which has resulted in substantial documented cost savings each year since 1970. This system is known as Technical Data Retrieval (TDR).

Independent researchers have established that the overall cost to produce the average part is approximately $2,000. One division of Pitney Bowes utilizing their TDR system for parts retrievals has reported annual savings each year since 1970 of over $200,000!

Group Technology in the manufacturing industry has been defined as the classification and grouping of parts according to their physical configuration and characteristics, and the arrangement of machine tool centers, compatible with these groupings. The key to group technology is the classification and coding of parts for manufacture according to their primary features and manufacturing processes. Pitney Bowes has this key, as all of their parts are now coded by their TDR system.

Pitney Bowes started classifying and coding their parts in 1969. This was done primarily for parts, methods sheets and tool retrieval purposes, that is, to retrieve previously designed tools, parts and related data for repeated use in new similar applications. It was done in anticipation of possible future use in practicing group technology.

The coding, gathering and storing of data on parts is the first and greatest cost of becoming involved in group technology. The coding, however, will more than return its initial expenditures by reducing costs in engineering and manufacturing. This is accomplished by using the data base so developed to retrieve previously designed parts and tools for repeated use.

Early in 1977 Pitney Bowes entered into a joint research agreement with Manufacturing Data Systems Inc. of Ann Arbor, Michigan. For this research project into group technology, the two companies merged the TDR data base and the numerical control (NC) machine tool data, with other manufacturing and production data to form a new Group Technology (GT) data base.

The new GT data base thus formed was accessed by an interactive software system which is conversational in nature. This program had the advantage of providing quick retrievals of families of parts and all known data, in a flexible user specified format through a high speed printer.

The objectives were to determine:

- what new parts may be manufactured with existing NC programs?
- can similar parts be grouped for more efficient production?
- what machine tools may be grouped to increase productivity?
- what cost savings can be realized?
- are there any other benefits to be derived?

The results of this GT research project were reported in an audio visual presentation which explained the methods employed to classify, code and gather the necessary engineering, manufacturing and production data; the use of the interactive computer program to solve actual problems and increase productivity in a variety of departments.

It has been estimated, by the participants in this project, that most departments will realize a savings of an amount equal to 10 to 15% of their annual budget during their first year of applying the principles of Group Technology, and from 15 to 30% in subsequent years.

PROBLEMS IN ACQUISITION
OF TECHNICAL DATA

by

Robert L. Tischer
Deputy for Acquisition Support
Aeronautical Systems Division
United States Air Force

SUMMARY

Air Force program offices have experienced engineering data acquisition problems in recent years. As a result of these problems, the Air Force is establishing overall regulatory policy and guidance for engineering data acquisition. The Air Force has also undertaken to determine engineering drawing requirements omitted from currently used source documents. These will be identified. Air Force initiatives to deal with these problems are summarized and ways to improve documents used in contracts are recommended.

INTRODUCTION - Problems in getting satisfactory engineering drawings for two programs, the F-15 Weapon System and the A-10 Weapon System, led to a series of audits of Aeronautical Systems Division (ASD) programs. Conducted during 1978-1979 by the ASD office of the Air Force Audit Agency, these reviews revealed several deficiencies in the contractual definition of engineering data requirements. Many of these deficiencies were common. This indicated a lack of understanding and resultant confusion on the part of the individuals determining engineering data requirements and writing technical contract provisions to meet these requirements.

Inadequate or improperly stated engineering drawing requirements impact total system cost and capability. The cost impact is often significant. The F-15 System Program Office is having to spend some millions of dollars to incorporate EOs into the final engineering drawings so these drawings will be sufficient for the user's needs. Likewise, the A-10 System Program Office is spending millions of dollars to change engineering drawings already prepared or to procure vendor data not ordered originally, again so the users can do their jobs. Some of the A-10 vendor data is no longer obtainable. F-15 vendor data has only been on order since last October. Some has already been delivered; while it doesn't look like there will be any more problems, only time will tell.

What is causing all this difficulty? What are the underlying problems? How do we attack and resolve these problems? During 1979 these and other questions were asked and addressed by the attendees at a series of six meetings and conferences.

DISCUSSION: During the series of meetings it became immediately apparent that the first and most immediate problem was to define our subject and the words used in discussing it. People experienced in the subject area tended to use words interchangeably that had different meanings to those less experienced than themselves. This led to misunderstanding and miscomprehension; subsequent discussions often revealed this. Some miscomprehensions probably exist to this day.

For any meaningful communication of thoughts and ideas to occur between or among individuals or groups, it is absolutely essential that the words used be consistent and clearly understood by all parties. This simple fact is the basis for many comedy routines and situation comedies presented in the movies and on television. What makes these presentations humorous is that the viewer can relate the misunderstandings and misapprehensions in the presented situation to situations previously experienced or witnessed. But it ceases to be humorous when misunderstandings and misinterpretations happen in real life and cause increased cost, purchase of useless materials and supplies, or even hardware failures leading to loss of life.

Reasons advanced for the lack of understanding and the confusion among members of the workforce included:

1. The series of changes in source documents, especially MIL-D-1000, which have occurred over the past five years.

2. The series of changes in DIDs (Data Item Descriptions), related to the source document changes.

AD-A169 665 PROCEEDINGS OF THE ANNUAL MEETING OF THE TECHNICAL DOCUMENTATION DIVISION..(U) AMERICAN DEFENSE PREPAREDNESS ASSOCIATION WASHINGTON DC MAY 80 3/4

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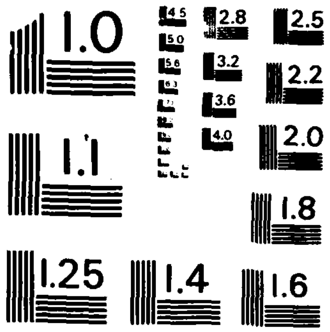

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

3. The absence of consolidated technical guidance in an easily understood reference. Existing Air Force documents do not address the total scope of the subject.

4. The absence of clear and consistently used definitions.

5. Conflicting definitions.

6. Ambiguous/unclear requirements as to exactly what data is needed, for what purpose, and when.

The replacement of the "Form and Category" system of MIL-D-1000 with the "Level" system of MIL-D-1000A has caused confusion regarding how to specify requirements which continues to this day. This situation has been sufficiently discussed already. I would only like to point out that the main problem here is tied in to point 4 above, i.e., unclear definitions.

The series of DID changes related to the implementation of the "Level" system of MIL-D-1000A caused problems in two general ways:

1. Development and production of new pieces of hardware contracted as supplemental agreements to existing contracts or as new contracts under existing programs led to "mixed requirements." For example, changes to the Statement of Work might call for preparation of engineering drawings and associated lists according to the "Level" requirements of MIL-D-1000A while the corresponding data requirement in the CDRL (Contract Data Requirements List) remained unchanged and called for "Form and Category" drawings under DI-E-3177.

2. When changing to the new DIDs to deliver "Level" drawings, there was (and still is in many cases) indecision whether to use Level 2 or Level 3. Once again, this problem is tied in to point 4, unclear definitions.

The ASD office of the Air Force Audit Agency found these problems of "mixed requirements" to be so common that they recommended HQ USAF/LEY request a review to encompass this and two other key deficiencies in stating contractual engineering drawing requirements. Acting on this recommendation, HQ USAF/LEY (by letter dated 9 Jan 1980) has requested HQ AFSC and HQ AFLC to jointly review current major acquisition contracts (greater than $50 millions) which require engineering drawings to ensure that the contract instructions appropriately specify the:

1. "Type" of drawings required (Level or Form and Category).

2. Technical preparation instructions required by DoD-D-1000B, MIL-D-1000A, MIL-D-1000 (para 6.2, Ordering Data).

3. Incorporation of engineering drawing changes into the affected drawings.

ASD/AW had previously directed a review by ASD programs for these specific objectives on 30 July 1979. A major difference is that the HQ USAF/LEY review will be by a team including representatives of the product division engineering drawing functional OPR, AFALD, and the program office.

A single document establishing general overall Air Force requirements for technical data sufficient to satisfy program needs throughout the entire life cycle of the system, subsystems, or equipment does not exist. In addition to establishing Air Force policy, definition of terms, and responsibilities in this area, such a document should also provide guidance on how to determine and define the requirements for any specific acquisition program as a function of position in the life cycle and then how to ensure delivery of a satisfactory product.

AFR 310-1 speaks to the Management of Contractor Data as a functional management discipline. AFR 310-3 speaks to Acquisition and Management of Data for Follow-On Procurements. AFR 67-80 (a joint service regulation published by Defense Logistics Agency) speaks to Technical Data Requirements for Logistic Support. AFLCR 67-26(C1) speaks to Engineering Data Acquisition and Logistics Management. Joint AFLC/AFSC Regulation 800-8 speaks to Acquisition of Engineering Drawings and Associated Lists and scopes the problem. Each of these documents contains some valuable information. All of them together, including other documents not listed here, do not constitute the complete policy and guidance required. Ample evidence exists that the present network is not getting the job done successfully.

Under the current joint AFLC/AFSC Regulation 800-8 responsibilities are assigned to elements of the two commands. But because the viewpoints of representatives from these various elements tend to be parochial, many problems arise that should never occur. Those involved in the acquisition process are generally familiar with the requirements for, and uses of, various types of data during the development and production phases of the life cycle. Less recognized are the requirements for data during the remainder of the life cycle. Breakout and competitive procurement of replenishment spares and reparable items is the activity that most often comes to mind. But other activities are also involved in managing the system throughout this subsequent period of its life. Some of these are:

1. Problem Analysis

2. Product Improvement

3. Modification Analysis, Assessment

4. Service Engineering

5. Configuration Management

6. Government Manufacture

7. Crash/Battle Damage Repair

In order to overcome these and other problems, the Air Force is striving to prepare, coordinate, and publish an 800-series regulation on the Acquisition Management of Engineering Data. It is hoped that this regulation can do several things.

1. Establish overall policy and guidance in this area at the Air Force level.

2. Establish a requirement to make engineering data acquisition an integral part of program planning, documented in program planning documents.

3. Require the designation of individuals as Engineering Data Management Officers (EDMOs) in both the program office and the prime ALC. The EDMO in the ALC would be responsible for determining ALC requirements and participating in all aspects of the acquisition. The EDMO in the program office would be responsible for getting the requirements into the contract and managing the acquisition through PMRT (Program Management Responsibility Transfer). The roles of these individuals are considered as being analogous to those in Technical Order acquisition management.

4. Establish that DoD-STD-100C definitions of terms shall be identical with Air Force definitions of terms.

5. Replace some existing documents.

The use of the term "engineering data" for this draft regulation leads us into some difficulties, however. These difficulties are part and parcel of the definition problem. The technical data required to manage any given article during the remainder of its life cycle following production may well include more than the engineering data as defined by DoD-STD-100C, but not necessarily all data generally defined as technical data by DAR. So what do we call this set of data? Reprocurement Data Package? Depending on the article and what is in its Reprocurement Data Package - maybe so, maybe not. The Army uses the term Technical Data Package. This seems to be a generally better term to this observer, but only so long as it doesn't get mixed up with other applications.

This problem of clear and consistently used definitions is not an easy one. For example, what do the words "other related reprocurement data" in DoD-D-1000B, para 3.3.3(c) mean? What do the words "accompanying documents" and "other information" in the DoD-STD-100C, para 719 definition for Engineering Data mean? Since peculiar item specifications prepared to MIL-STD-490 format under the requirements of MIL-S-83490 are prepared by the contractor, some people will interpret these as being part of engineering data. Others will know better. But the words are not clear enough.

Referenced documents as defined in DoD-STD-100C, para 401.1 include "pamphlets or other documents referenced on drawings or lists." Then para 402.3 of the same document says in its last sentence that "Technical orders, pamphlets, recordings are not considered reference documents." DoD-D-1000B, para 3.8, excludes technical manuals, procedural manuals, maintenance manuals and company drafting manuals. Is it any wonder the occasional user gets confused? These types of inconsistencies and conflicting definitions need to be scrubbed out. One definition should be established and adhered to. All exceptions should be listed with the definition.

People are confused by the fact that while DI-E-7031 is entitled "Drawings, Engineering and Associated Lists," a requirement for Level 3 drawings delivers not only the drawings and associated lists but also contractor documents referenced on the drawings. Taken together with the statement in DoD-D-1000B, para 3.3.3 that "These engineering drawings shall: (b) provide the engineering data for the support of quantity production;" the statement in para 6.6 of this same document, "Terms and definitions. See MIL-STD-100;" and the definition of engineering data in DoD-STD-100C, para 719, one is led to the conclusion that ordering Level 3 drawings will deliver a Level 3 engineering data package. It is a small jump to the next conclusion that this contains everything one could possibly need, hence a Level 3 Reprocurement Data Package.

Although inconsistent, unclear, and even conflicting definitions abound, seeming sometimes to multiply like rabbits and DIDs, some consistency of definitions does exist. For example DoD-STD-100C, AFR 67-4, and AFR 67-80 all agree exactly in their definition of engineering data. Definitions for technical data in DAR 1-201.36, 7-104.9(a), 7-104.9(c), and 9-201(b) all agree. But consistency in usage is every bit as important as consistency of definition. I believe we cannot hope to have consistency of usage until we have consistency of definition.

Ambiguous, unclear, and indeed even undefined requirements found in contracts are the result of confusion and uncertainty on the part of the people charged with determining exactly what data is needed, for what purpose, and when. We've talked about some of the reasons. Others include changing program direction, changing program funding, poor decisions. The situation was further compounded for the Air Force by the cancellation in June 1979 of AFAD 71-700, Engineering Data Preparation Contract Provisions for Non-Government Design Activity Drawings and Lists.

A meeting was convened in November 1979 by HQ AFLC/LOLDE to review Air Force engineering data requirements not currently identified in authorized source documents listed in the AMSDL (Acquisition Management Systems and Data Requirements Control List, DoD 5000.19-L, Vol II). The $3\frac{1}{2}$ day meeting included representatives from the Air Logistics Centers who could explain and defend their inputs. The following list sets forth the consensus of the meeting regarding what needs to be done. The approach under consideration at the time was to prepare an Air Force amendment to DoD-D-1000B, so the statements are written for that approach.

1. Need a clearer explanation for Levels; if this is not possible, then perhaps we need another way to express the notion.

2. Add 9 documents to the List of Applicable Documents (4 specs, 4 stds, 1 manual).

3. Require prime contractors to levy requirements of DoD-D-1000B on their contractors.

4. Exercise reasonable care to prevent reacquiring or resubmitting engineering data from other sources.

5. Emphasize that logistics or other needs not strictly of an engineering nature are important as a determinant in selecting types and numbers of engineering drawings.

6. Provide full (sufficient) coverage for all aspects of engineering data use.

7. Allow "spot shots" only by prior agreement, incorporated into the contract.

8. Need to combine the basic and associated lists for engineering, procurement, government manufacture, etc., into a single deliverable product. (Technical Data Package and Indentured List?)

9. Need a shipping list (MIL-D-5480E, para 5.3) with each shipment. This could be done by adding a requirement to deliver a shipping list in DoD-D-1000B, para 5.1.1; or take it out of DoD-D-1000B, para 5.1.2 and make it a separate requirement of the specification; or add as a requirement to DI-E-7031.

10. Combine MIL-STD-885B Procurement Data Package List and DoD-STD-100C Data List into a single type of list for both procurement and engineering use. Ample experience with older systems indicates having such a list for every configuration item and non-standard assembly would be extremely cost effective in that it would support spares procurement throughout system life, regardless of source code changes. (This would seem to be a subset of item 8 above).

11. Elaborate on the requirements for coverage of standard commercial items.

12. Put an Application Block on the drawing referencing next higher assembly and final assembly. (ADPA recommendation is to use the contractor's Master Engineering Drawing Usage List - it is cheaper to maintain).

13. Require drawings to identify the method of marking and the marking location on the part. (ADPA recommends requiring this only when the marking method or its location would affect the part's function, reliability, etc.)

14. Identify which parts are Interchangeable and Replaceable (I&R) when the drawing contains both parts that are (I&R) and other parts that are not (I&R).

15. Require incorporation of engineering changes into the drawings within certain stated elapsed times and before final delivery. (This is a multi-million dollar lesson learned).

16. Specify the citation of documents.

17. Show contract number in Title Block.

18. Add a requirement not to show FMS (Foreign Military Sales) peculiar information on drawings for DoD military contracts.

19. Whenever nuclear Hardness Critical Items (HCIs) are involved, all applicable drawings must identify individual HCIs on the drawing, on the parts list, and on the list of materials. Nuclear Hardness Critical Processes (HCPs)

must also be identified in applicable drawings and notes. (Nuclear Hardness Critical Items are any items at any assembly level which are mission critical and could be designed, repaired, manufactured, installed, or maintained for normal operation and yet degrade system survivability in a man-made hostile environment if hardness were not considered. Nuclear Hardness Critical Processes are processes, specifications and/or procedures which are hardness critical, and which, if changed, could degrade nuclear hardness).

20. Require the use of the English language unless specified otherwise.

CONCLUSIONS AND RECOMMENDATIONS - The Air Force has taken and is taking steps to remedy its engineering data acquisition problems.

1. An Air Force regulation on Acquisition Management of Engineering Data is nearing completion which will:

a. Establish overall policy and guidance at the Air Force level.

b. Require that engineering data acquisition be made an integral part of program planning, documented in program planning documents.

c. Require the designation of responsible individuals in the program office and prime ALC.

d. Establish definitions.

e. Replace some existing documents.

2. A review of current major acquisition contracts is being conducted to ensure engineering requirements are appropriately stated.

3. Improvements required in currently used source documents have been identified and are summarized herein.

4. AFR 310-1 is being changed to require inspection at the source and acceptance at destination for engineering data.

Beyond this, it is recommended that:

1. Action be taken to clarify definitions so they will be comprehensible to the occasional user as well as the specialist.

2. DI-E-7031, Drawings, Engineering and Associated Lists, should be revised.

a. Clearly state in Block 3 what the data item will deliver.

b. Caution the user in Block 7 that this data item requirement does not deliver a complete technical data package. List other types of data that may be required to give a sufficient technical data package, if that is what is needed.

3. Consideration be given to developing a document, perhaps a military specification or standard, that will serve to organize and present in a logical manner all the individual data item components required to comprise a set of technical data sufficient to manage systems, subsystems, or equipment during their life cycle following procurement. Such a document could do much to standardize definitions and eliminate confusion. The data items themselves would continue to be ordered and managed independently.

- CHANGES IN SOURCE DOCUMENTS
- CHANGES IN DIDs
- ABSENCE OF CONSOLIDATED GUIDANCE
- UNCLEAR/INCONSISTENTLY USED DEFINITIONS
- CONFLICTING DEFINITIONS
- AMBIGUOUS/UNCLEAR REQUIREMENTS

- HQ USAF/LEY DIRECTED REVIEW
  - "TYPE" DRAWINGS REQUIRED
  - ORDERING DATA
  - INCORPORATION OF EOs

- PROBLEM ANALYSIS
- PRODUCT IMPROVEMENT
- MODIFICATION ANALYSIS, ASSESSMENT
- SERVICE ENGINEERING
- CONFIGURATION MANAGEMENT
- GOVERNMENT MANUFACTURE
- CRASH/BATTLE DAMAGE REPAIR

AFR 800-XX, ACQ MGT OF ENGR DATA

- ESTABLISH OVERALL POLICY/GUIDANCE
- INTEGRAL PART OF PROGRAM PLANNING
- DESIGNATE EDMOs
- ESTABLISH DEFINITIONS
- REPLACE SOME EXISTING DOCUMENTS

UNCLEAR DEFINITIONS

- DOD-D-1000B, PARA 3.3.3(c)
  "OTHER RELATED REPROCUREMENT DATA"
- DOD-STD-100C, PARA 719

  "ACCOMPANYING DOCUMENTS"

  "OTHER INFORMATION"

INCONSISTENT/CONFLICTING DEFINITIONS

- DOD-STD-100C, PARA 401.1
- DOD-STD-100C, PARA 402.3
- DOD-D-1000B, PARA 3.8

EXAMPLE OF A SET PRODUCING CONFUSION

- DOD-D-1000B, PARA 3.3.3 (b)
- DOD-D-1000B, PARA 6.6
- DOD-STD-100C, PARA 719

SUMMARY OF AIR FORCE ACTIONS TO DATE

- COMPLETING WORK ON AFR 800-XX
- REVIEW OF CONTRACT REQUIREMENTS
- IDENTIFIED REQ'D SOURCE DOC. CHGS
- CHANGE AFR 310-1

RECOMMENDED OTHER ACTIONS

- CLARIFY DEFINITIONS
- REVISE DI-E-7031
  - BLOCK 3
  - BLOCK 7
- DEVELOP DEFINING DOCUMENT

INTERNATIONAL STANDARDIZATION BRIEFING

Mr. Charles A. Fricke

NOTE: This paper was transcribed from a recording of Mr. Fricke's presentation.

It is indeed a pleasure for me to have this opportunity of addressing the Technical Documentatio Division of ADPA. .... Now that we've gotten the introduction straight, just what can I offer in the way of information on engineering drawing practices and related international standardization activities. Needless to say, this is a big area with many intertwining relationships between many organizations and committees. For example: the U.S. secretariat of Y14 on drawing practices are ASME and SAE; for Y32 on graphic symbols, we have IEEE and ASME; for Y10 on letter symbols, it is ASME; and the list goes on and on--with the secretariats in turn responsible for delegating the authority for developing the U.S. national standards to subcommittees like ANSC Y14.1, Y14.5, etc. This should give you some idea as to where you might be in the overall picture. Then you must realize that the same thing happen in other countries, all of which should show you the impact of international standardization on the limites international and national standards of both industry and military in some 40 to 60 countries.

Figure 1 provides a simplified overview of international standardization. Basically, the prime organizations for international standards are the International Standardization organization (ISO) and the International Electrotechnical Commission (IEC). Now you may wonder, "why the two?" Well, IEC is the oldest having been established in 1906 to develop standards in the electrical field (now also in electronics). ISO was organized in 1947 and covers the rest of the areas of standardization. Between the two, we have well over 200 technical committees, plus subcommittees and working groups. These probably total up to over 1000 possible sources for international standards. Then add to that the number of people involved in the development of international standards (my guess would be over 10,000 or more). For example, the 45th general meeting of IEC is being held in Stockholm next month. There will be meetings of some 34 technical committees and subcommittees to which the U.S. is sending 125 people. This should give you some idea as to the immensity of the work in international standards. Now let's look at it in more detail.

In ISO (Figure 2), there are two major committees of interest to us. One is the technical committee on technical drawings, TC10, which is like a combination of our own Y14 and Y32 committees. The other one is the technical committee on the coordination of graphic symbols, TC145, which also directly impacts Y32. TC10 is composed of eight subcommittees and numerous working groups. In order for ANSI as the member body of ISO to support the work of TC10, it provides for Technical Advisory Groups (TAG) to be responsive to the work in TC10. One of the TAGs which covers a number

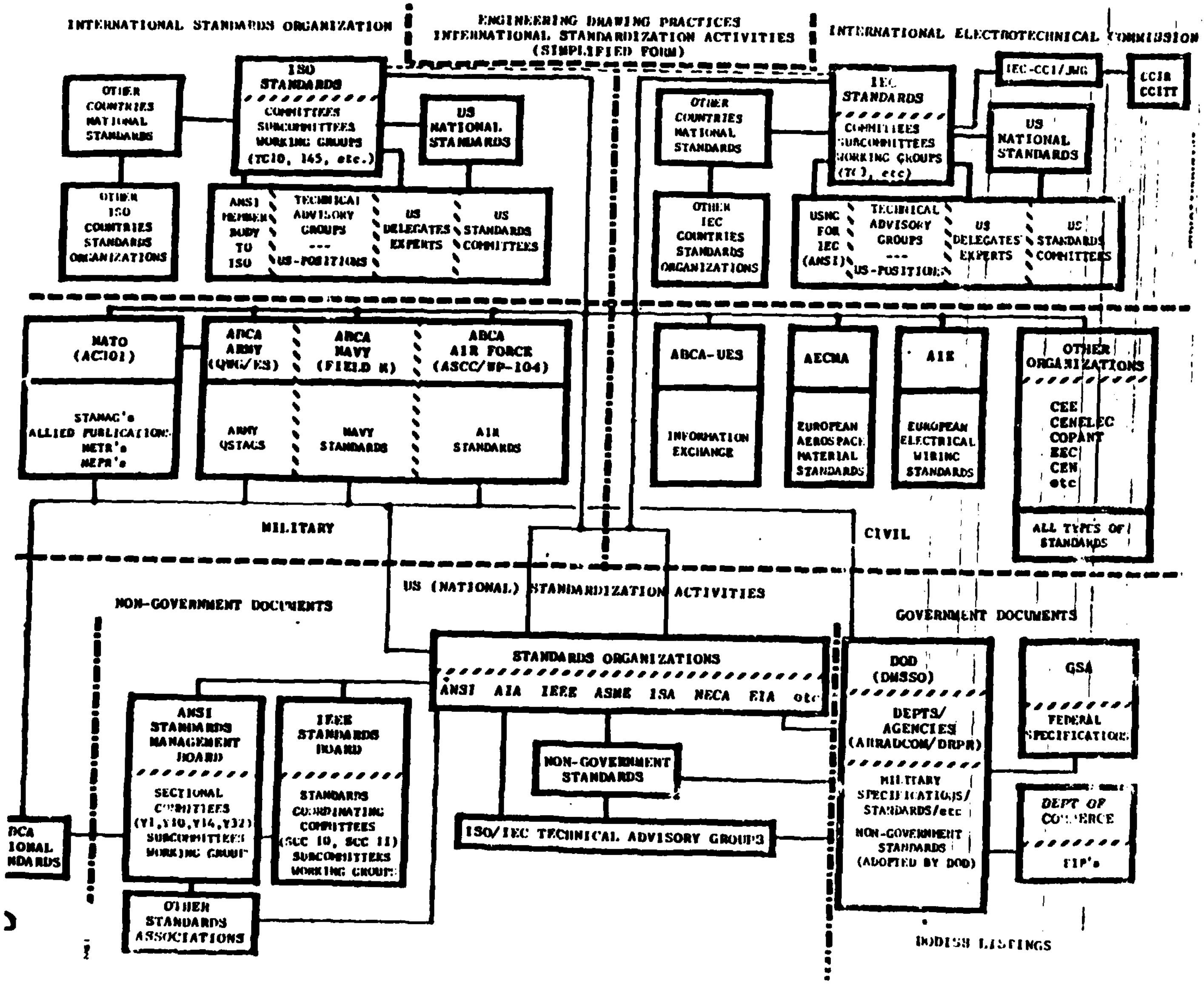

Figure 1. International Standardization Activities

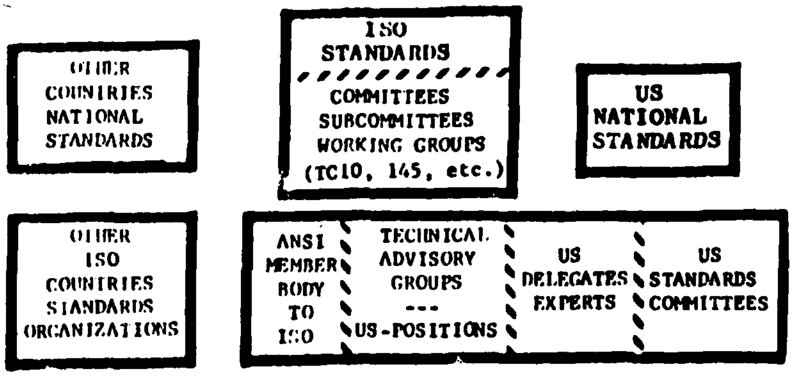

Figure 2. International Standards Organization

of TC10 subcommittees is composed of the same membership of ANSC executive committee and members-at-large, with ASME as the secretariat. Another TAG for TC10/SC3 on instrumentation has as a secretariat the Instrument Society of America. The TAG for TC145 has the Department of Transportation in Washington,DC as its secretariat. This type of organizational structure allows for the direct relationship of our own national standards committees in drawing practices and graphic symbols to be counterpart to their counter parts in international standardization activities. The TAGs not only provide the technical review of ISO documents,but also develop U.S. position papers and send delegates (technical experts) to the meetings of TC10 and TC145, its subcommittees and working groups.

In reality we have a two-way street with the international standardization effort being reflected in our national efforts and in turn the national efforts influencing the the international work. Of course while the U.S. is acting on the ISO documents, so are the other countries that have an interest in the subject. Thus at each meeting, the detail content of each document and the comments received are reviewed by the attendees/delegates to ensure that the best possible consensus document is obtained for an international standard.

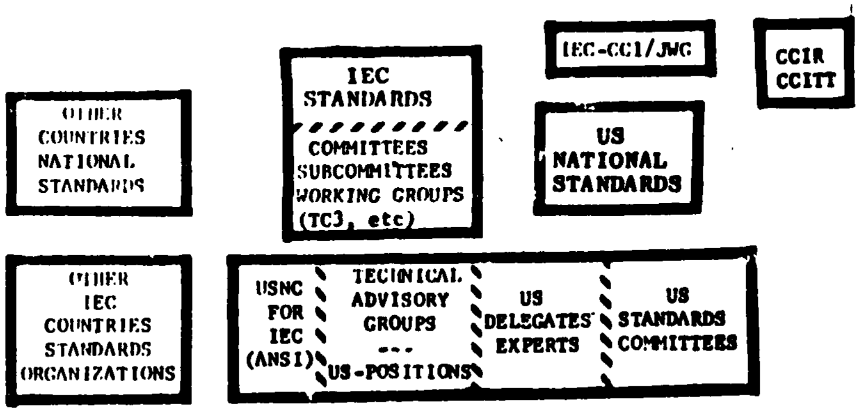

Figure 3. International Electrotechnical Commission

Figure 3 depicts the IEC structure which is basically the same as the ISO except in this case the United States National Committee for the IEC with ANSI as the administrative organization is responsive to the work in IEC. The technical advisory group for IEC/TC3 is IEEE Coordinating Committee with several related IEEE groups participating, and IEEE Standards Office serving as the secretariat. It includes:

Subcommittee	Subject
SC3A	Graphic Symbols
SC3B	Charts, Tables, and Item Designations
SC3C	Graphic Symbols for Marking on Equipment

The same detailed work in reviewing documents and providing comments, U.S. possition papers and delegates/experts to the meetings of TC3 and its subcommittees and working groups is done by the TAG. The interrrelationship between the IEC and the Y14, Y32, and IEEE standards is considered. There is one small difference in the work of TC3 in that there is a joint international working group which does the preparatory work for SC3A and SC3B, and reviews SC3C proposals. The JWG is composed of members representing IEC (6 members), CCITT (3 members), and CCIR (3 members) with a chairman and secretary. The members of the JWG act on behalf of their parent international organization, not the country they come from. For instance, as an IEC member of the JWG, I am responsible for ensuring the actions taken by the JWG are in the best

interests of IEC and its work in standardizing graphic symbols and drawing practices in the electrical/electronic field will be accepted by all countries. As a result of this JWG, CCITT/CCIR do not publish their own separate standards, but reference the IEC standards.

Now that we have seen the organizational structures of ISO and IEC, let's look at the types of documents you might see if you participate in a TAG (Figure 4).

Before any detailed work can be undertaken by the various TCs in either ISO or IEC, the new work must be agreed upon by a majority of national countries wanting to participate in that type of standardization. After approval, then either a working group or subcommittee prepares the initial and subsequent drafts. In ISO, these are designated as Draft Proposals (DP) and sometimes circulated under an "N" number. In IEC, draft proposals are identified as secretariat documents.

When the secretariat and subcommittee/working group chairman determines that a draft document has sufficient support to ensure probable acceptance as an ISO or IEC standard, the main committee prepares it in final form. This final draft complies with the style manuals and is submitted to the participating countries. These drafts are called Draft International Standards (DIS) in ISO and Central Office (CO) documents with 6 month voting period in IEC.

In the case of IEC, if most of the 6 month CO document is acceptable or approved, but a technical change is agreed upon at the meeting, then a 2 month Central Office document is published. If the changes contained in the 2 month CO document are approved, then these changes and the unchanged portion of the 6 month document are issued as an IEC standard. If the changes are not approved, the original 6 month CO document is published as the IEC standard.

ISO	IEC
AGREEMENT BY PARTICIPATING MEMBERS OF A TECHNICAL COMMITTEE/SUBCOMMITTEE TO PURSUE THE WORK OF PREPARING A DRAFT DOCUMENT	AGREEMENT BY PARTICIPATING MEMBERS OF A TECHNICAL COMMITTEE/SUBCOMMITTEE TO PURSUE THE WORK OF PREPARING A DRAFT DOCUMENT
WORKING GROUP SUBCOMMITTEE DP - DRAFT PROPOSAL (ANY NUMBER OF DRAFTS)	WORKING GROUP SUBCOMMITTEE SECRETARIAT - DRAFT DOCUMENT (ANY NUMBER OF DRAFTS)
TECHNICAL COMMITTEE DIS - DRAFT INTERNATIONAL STANDARD (VOTING DOCUMENT)	SUBCOMMITTEE TECHNICAL COMMITTEE CENTRAL OFFICE - 6 MONTH VOTING DOCUMENT CENTRAL OFFICE - 2 MONTH VOTING DOCUMENT (TECHNICAL CHANGES TO 6 MONTH DOCUMENT - IF NOT APPROVED - REVERTS BACK TO CONTENTS OF 6 MONTH DOCUMENT)

Figure 4. Simplified Comparison of Document Status in ISO and IEC

During the work of preparing drafts, other TCs, SCs, and WGs are notified of subjects which are of mutual interest. This is true of both IEC and ISO activities.

Earlier I mentioned the interrelationship of the work in IEC, CCITT, and CCIR organizations. The same coorporation exists with other limited international standards making organizations. "Limited" in this sense refers to the number of countries involved in the organization, not the area of standardization interest. For example: the aerospace standards of AECMA (an organization like our own AIA) are taken into account during the development of related international standards--for there is no sense in duplicating work which has already been done. New/revised standards are also developed in conjunction with such organizations when such work would be useful to both organizations. This was true when IEC/TC3/SC3A was updating and revising IEC Publication 117 (graphic symbols for electrical wiring diagrams) for incorporation into IEC Publication 617 as Chapter 8. The AIE (the European Association of Electrical Contractors) which is like our own National Electrical Contractors Association (NECA) worked with the JWG to approve, revise, or develop new symbols. When IEC Pub. 617 is published, AIE will require its use by the members of AIE. In turn member nations may in turn adopt the IEC standard as their own national standard.

So we find ourselves in a round-robin of standards and standards making organizations. As shown in Figure 5, thare are numerous organization which are in this interrelationship. The more one knows about what is going on in these other areas, the better opportunity it affords one of knowing how they interrelate.

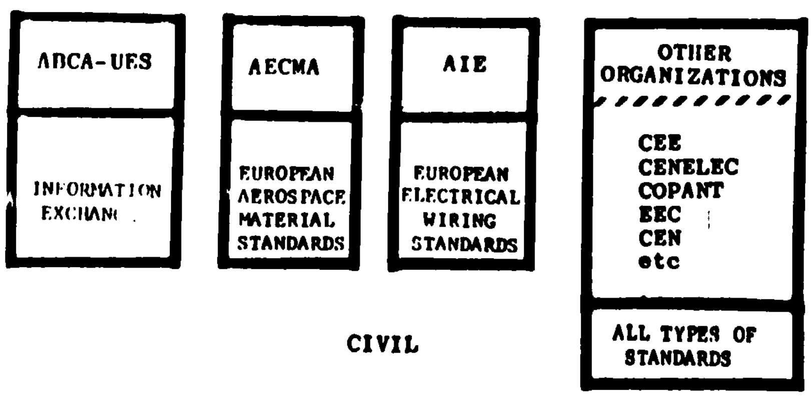

Figure 5. Typical Limited International Standards Organizations

In Figure 7, we see the major international standardization organizations which might influence our standards for engineering drawing practices. This listing highlights the wide range of organizations that are interested in international standards. Usually someone in an ISO or IEC committee is aware of other international organizations which are interested in some portion of the work being done. Contact is made and the effort is coordinated appropriately. The chairman and secretariat are responsible for ensuring that the work being undertaken is done in an approved manner and as authorized by the ISO/IEC administative committees.

I briefly touched on the interrelationship of the national standards to the international standards. Figure 6 shows a little more detail of this relationship. Again there is a round-robin effort within the U.S. to develop standards according to discipline and then, in turn, to ensure that the national standards are aligned with the ISO/IEC standards to the best extent possible.

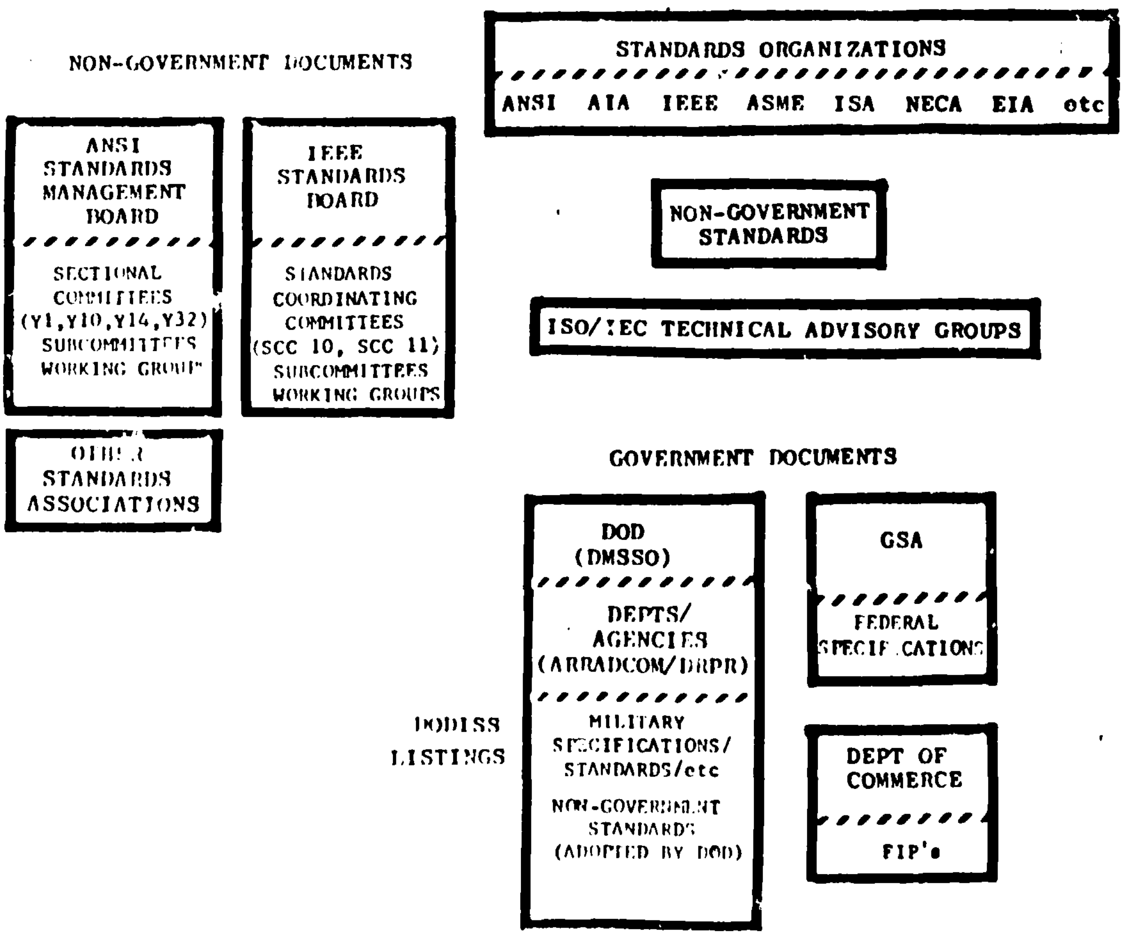

Figure 6. U.S. (National) Standardization Activities

The ABCs of International Standardization

ISO, IEC, and a host of intergovernmental, regional, and other organizations are concerned with international standardization. Some of the principal ones are identified and described in the list that follows. The initials and titles are the ones used in English speaking countries. Initials derived from French titles are included in the descriptions.

STANDARDS ORGANIZATIONS

ABCA — American British Canadian Australian Committee on Unification of Engineering Standards. Standards bodies of USA, UK, Canada, and Australia, with defense government representatives participating in meetings. Founded toward the end of the Second World War to standardize certain basic engineering standards, such as screw threads, limits and fits, and drawing practice, of first importance both to the military and to industry.

ASAC — Asian Standards Advisory Committee. Set up in 1966 under ECAFE (see UN Agencies) auspices to promote coordination among existing national standards bodies in the region and to assist in the establishment of new ones. Regional standards not envisaged.

CEE — International Commission on Rules for the Approval of Electrical Equipment (CEE Anhang). Founded 1926. Comprises national electrotechnical committees of 22 European countries, with Australia, Canada, Hong Kong, Ireland, India, Japan, South Africa, and the USA as observer members. 33 published specifications. "CB" certification body for domestic electrical equipment.

CEN — European Committee for Standardization. Founded 1960. Comprises national standards bodies of EEC and EFTA countries. Prepares European standards, which, if accepted by a significant majority of CEN members, are published without variation of text in the countries accepting them as national standards. A significant majority is defined as at least twice as many positive as negative vot , where at least four members cast positive votes and where the positive votes represent at least two-thirds of the production and consumption of the product concerned in the countries represented in CEN.

CENCER — CEN's certification body.

CENELEC — European Committee for Electrotechnical Standardization. Electrotechnical counterpart of CEN. Founded 1972 from union of CENEL and CENELCOM. Comprises national electrotechnical committees of the same 14 Western European countries as CEN.

CECC — CENELEC Electronic Components Committee. Produces harmonization documents with which national standards can be brought into line, with built-in quality assessment.

CISPR — International Special Committee on Radio Interference. Set up under the aegis of IEC, bringing together IEC member committees and other international organizations in the electrical, broadcasting, and transport fields.

COPANT — Pan American Standards Commission. Founded 1961. Comprises national standards bodies of 13 Latin American countries. A coordinating organization concerned primarily with the regional implementation of ISO and IEC recommendations.

IEC — International Electrotechnical Commission (CEI). The electrotechnical counterpart of ISO. Founded 19[illegible]. Comprises national electrotechnical committees of over 40 countries. Publishes recommendations and reports, approved if not more than 20% of national committees cast negative votes. 600 committees and subgroups.

IFAN — International Federation for the Application of Standards. An international association of standards user organizations that cooperates with ISO and IEC. Founded 1974.

ISO — International Organization for Standardization. Founded 1947. Comprises national standards bodies of 67 countries plus 20 correspondent members. Over 3000 recommendations or standards published. Standards based on approval by [illegible] of member bodies. 153 technical committees; over 600 subcommittees; over 1150 working groups.

CERTICO — Certification Committee

COPOLCO — Consumer Policy Committee

DEVCO — Development Committee

EXCO — Executive Committee

INFCO — Standing Committee for the Study of Scientific and Technical Information

ISCA — International Standards Steering Committee for Consumer Affairs (ISO, IEC, and consumer organizations)

PLACO — Planning Committee

STACO — Standing Committee for the Study of the Principles of Standardization

PASC — Pacific Area Standards Congress. Formed 1973 to strengthen ISO and IEC and the ability of the Pacific area nations to participate in these organizations.

Figure 7. Limited International Standardization Organizations

Tripartite Committee ... bodies of UK, France, and Germany.

INTERGOVERNMENTAL ORGANIZATIONS

EC	**European Communities** (CE). Belgium, Denmark, France, West Germany, Ireland, Italy, Luxembourg, Netherlands, UK.
CCE	Commission of the European Communities. Comprising 13 Commissioners responsible for initiating and executing community policy adopted by the Council of Ministers. As such, answerable to the European Parliament. Acts as mediator between member governments and guardian of the treaties. 7375 administrative staff located in Brussels and Luxembourg. The President and Vice President are appointed from the members for renewable two year terms.
ECSC	European Coal and Steel Community (CECA) founded by the Paris Treaty, 1951.
EEC	European Economic Community (CEE Bruxelles). The "Common Market" founded by the Treaty of Rome, 1957.
EURATOM	European Atomic Energy Community founded by a second Rome Treaty, 1957.
EFTA	European Free Trade Association (AELE). Austria, Norway, Portugal, Sweden, Switzerland, Finland, and Iceland.
GATT	General Agreement on Tariffs and Trade. A multilateral treaty embodying a general code of conduct covering virtually the whole field of the commercial relations of the more than 90 member countries.
OECD	**Organization for Economic Cooperation and Development** (OCDE). Founded 1961. Comprises Western Europe, plus USA, Canada, and Japan.

UN Related Regional Agencies

CODEX	Codex Alimentarius Commission. Created to implement the Joint FAO/WHO Food Standards Program.
ECA	Economic Commission for Africa (CEA)
ECAFE	Economic Commission for Asia and the Far East (CEAEO)
ECE	Economic Commission for Europe (CEE Genève). Acts to facilitate trade in Europe and notably prepares regulations associated with "E" mark certification scheme (now operating for motor vehicle accessories).
ECLA	Economic Commission for Latin America (CEPAL)
ECOSOC	Economic and Social Committee
FAO	Food and Agriculture Organization
IAEA	International Atomic Energy Agency (AIEA)
ICAO	International Civil Aviation Organization
ILO	International Labor Organization (OIT)
IMCO	Intergovernmental Maritime Consultative Organization (OMCI)
ITU	International Telecommunications Union (UIT). Work carried out by two committees: International Radio Consultative Committee (CCIR) and International Telegraph and Telephone Consultative Committee (CCITT)
UNCTAD	UN Conference on Trade and Development (CNUCED)
UNESCO	UN Educational, Scientific and Cultural Organization
UNIDO	UN Industrial Development Organization (ONUDI)
WHO	World Health Organization (OMS)
WIPO	World ... tual Property Organization
WMO	World Meteorological Organization (OMM)

Weights and Measures

CGPM	**General Conference of Weights and Measures.** Membership drawn from those 41 nations that are signatories to the Meter Convention. The Conference meets at approximately four-year intervals.
BIPM	International Bureau of Weights and Measures. The metrology laboratory under the responsibility of the CIPM; it can arrange for the measurement standards of any country to be compared with internationally agreed upon standards.
CIPM	International Committee of Weights and Measures. Responsible for implementing decisions of the CGPM and preparing for each Conference.
OIML	**International Organization of Legal Metrology.** Set up in 1955 to resolve the technical and administrative problems of legal metrology raised by the construction, use and checking of instruments of measurement and to facilitate cooperation among nations in this field. 42 member nations.

Adapted from Short Guide to International Organizations Concerned with Standards, a publication of the British Standards Institution.

SP 7B — January 1975

Figure 7. Limited International Standardization Organizations (continued)

It is the aim of our international standardization program efforts in the U.S. to ensure that: (1) the content of the U.S. national standards are reflected in the ISO/IEC standards and (2) when ISO/IEC standards are approved by the U.S., their content and requirements are incorporated into the U.S. national standard.

During all this effort the needs of the military must be taken into account. For as you well know, the DoD is committed to use national standards that meet the requirements of the DoD. For example, DOD-STD-100C invokes 30 non-government standards covering drawing practices and graphic symbols.

The national committees responsible for these standards also consider the ISO/IEC work. For example, SC3B will review the voting on two logic diagram documents at its Stockholm meeting. If these are accepted as IEC standards, then the content of these two documents will become the basis for the U.S. standard on Logic Diagrams. The same is true of the work in SC3A on graphic symbols. When IEC Pub 617 is approved, the IEEE committees will revise IEEE Std 315 (Y32.2) and IEEE Std 91 (Y32.14) based on the IEC standard.

Not to be forgotten is the work in IEC/TC3/SC3C for symbols for marking on equipments. This work covers symbols instead of words for marking controls, etc, on equipment. You may not have faced the problem yet, but you will soon enough. For example, CEPT (the European Committee for PTTs) is requiring symbols on all equipment, especially new telephone and telegraph equipment.

When we approve an ISO/IEC standard, we are supposed to be accepting the work as a national standard. So in the middle of all this effort, the technical advisory groups to the various TCs must recognize the impact of the work on the national standards.

Sometimes a country will find itself a leader in the state-of-the-art, like our work on dimensioning and tolerancing as shown in Y14.5, and its national standard or the contents of it may be used as the basis for the international standards.

What more can I say, except that when you review a draft document of national standard, you should realize that it has been impacted by the work in the international standardization arena.

Up to now, we have touched on the ISO/IEC work and to some extent on their impact on civil, limited international standardization and U.S. national standards and vice versa. This two-way street is not always relatable on a one-to-one basis. When this happens, it is necessary to make adjustments in the U.S. national standards by identifying the differences between national and ISO/IEC standards and through a slow process of changing U.S. standards to the degree necessary to bring it in line with the international standard. All this providing, of course, that the end result does not exert undue hardship and cost on U.S. industry or the military application.

Having come to this point, what remains will probably be of significant interest to those of you who are involved in multinational programs. The areas involved (Figure 8) are the NATO activity and the following American-British-Canadian-Austraian groups:

ABCA Army - Quadripartite Working Group on Engineering Standardization (QWG/ES).

ABCA Navy - activity relates directly to engineering standards (Field Zed).

ABCA Air Force - Air Standards Coordinating Committee, Working Party 104 on engineering standards and associated data.

The ABCA groups meet at a 12 to 18 month interval for the purpose of reviewing the status of work and documents for which they have assigned responsibility.

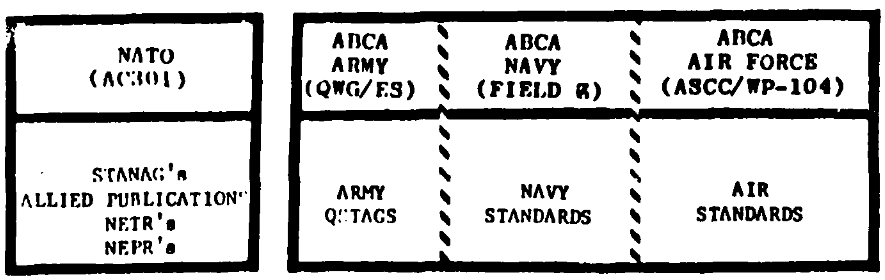

Figure 8. Limited International Standardization Activities (Military)

QWG/ES has been assigned the rsponsibility for approximately 65 Quardripartite Standardization Agreements (QSTAG). These are in various stages: some published, some in final draft form for ratification,some in preliminary draft form. The principle members of each country are responsible for ensuring that work progresses in accordance with the plan contained in the Memorandum for Record (Figure 9). To further ensure non-duplication of effort, the Armies are expected to work with the respective Navies, and Air Forces to determine their interest in the project. The result is a three-way street for four countries with cross-connections to national standards, international standards, and NATO activity.

ABCA

ARMIES STANDARDIZATION PROGRAM

MEMORANDUM FOR RECORD NINTH MEETING OF THE QUADRIPARTITE WORKING GROUP ON ENGINEERING STANDARDIZATION

MINISTRY OF DEFENCE

DIRECTORATE OF STANDARDIZATION

HIGH HOLBORN LONDON ENGLAND

8-17 OCTOBER 1979

Figure 9 ABCA QWG/ES Memorandum for Record

QSTAGs include several different types of documents. One type lists the national standards which each Army agrees will be used in accordance with the requirements of the Detail of Agreement. For example, QSTAG 253 lists DOD-STD-100 (which references more than 30 non-government standards) as the basis for drawing practices in the U.S. The BCA countries also identify their national standard for drawings. These in turn reference numerous non-government documents--more round-robin effect which greatly amplifies the effects of a revision to any single document.

Another type of QSTAG contains a complete standard on the subject. For example, the one on environmental conditions. The third type might extend the basic requirements of another standard.

Much of what is said about the QWG/ES activity can be repeated for the ABCA Navy activity in the Field Zed (Figure 10). Their output being NAVSTACs.

The ABCA Air Standards Coordinating Committee, Working Party 104 (Figure 11) is also responsible for engineering and associated data--another group standardizing on engineering drawings. Again, there are efforts by each of the countries to interact within their own countries to ensure non-duplication of effort. In each case, the work results in a published document, an Air Standard, which contains the details of the agreement.

The overall products of the three groups (QSTAGs, NAVSTAGs, and Air Standards) are listed in the DoD Index of Specifications and Standards (DODISS) under International Standards and are available from the Naval Publications and Forms Center in Philadelphia.

The fourth military limited international standardization activity is NATO, AC301. While the overall effort in AC301 covers a wide range of subjects in the engineering and components area, this briefing will be limited to engineering drawing activity.

With the permission of Mr. Don Mitchell, the U.S. representative to AC301, I will review some of the details of AStanP-2 and NATO AC301/D49.

The concept and organization of AStanP-2 (Figure 12) was proposed by the U.S. as the result of reviewing drawing from eight different countries. It was apparent that in spite of the many efforts of ISO and IEC to standardize on drawing practices and graphic symbol, there are still many cases where drawing prepared in one country and submitted to another country under a multinational program are not completely understood. The offer to prepare the document was accepted by AC301 and so AStanP-2 was born. It serves as a guide to variations in drawing practice for those involved in multinational programs. The final draft was approved at the January 1979 meeting of AC301 for publication as an allied publication on standards.

1979

AMERICAN · BRITISH · CANADIAN · AUSTRALIAN
NAVAL QUADRIPARTITE STANDARDIZATION

FIELD Z
STANDARDIZATION OF ENGINEERING MATERIALS AND PRACTICES

28th ANNUAL CONFERENCE
M.O.D. OFFICES
ENSLEIGH BATH
U.K.

18th – 27th SEPTEMBER 1979

Figure 10. Typical ABCA Naval Standardization Meeting Report

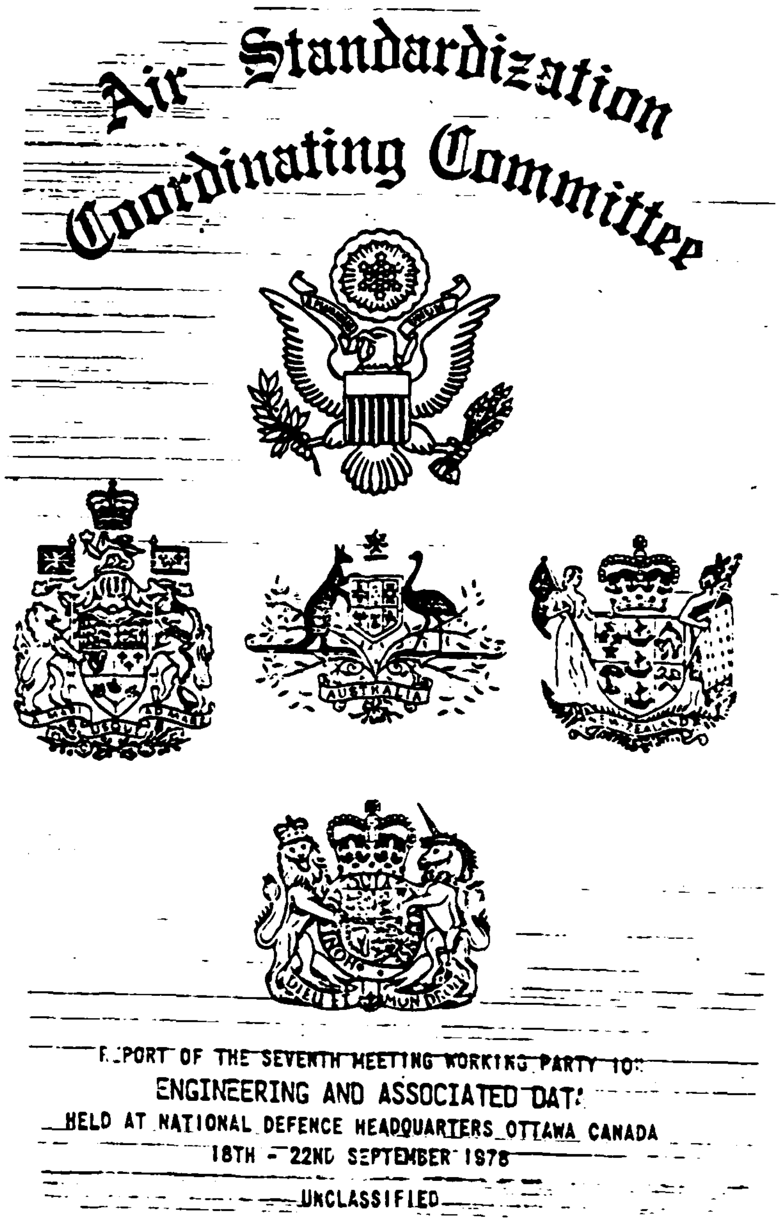

Figure 11. Typical ABCA Air Standardization, Working Party 104 Meeting Report

NATO UNCLASSIFIED

NATO INTERNATIONAL STAFF - DEFENCE SUPPORT DIVISION

ALLIED
MATERIEL
STANDARDS
PUBLICATION

AStanP-2

NATO GUIDE TO VARIANCES IN DRAWING PRACTICE

August 1979

NATO UNCLASSIFIED

Figure 12. Cover of NATO Guide to Variances in Drawing Practice AStanP-2

The preface page of AStanP-2 (Figure 13) explaines in detail the scope, description, aim, use, and implementation of the documents. It a few words, it means that each of you involved in a multinational program should have a copy for ready reference to variances in drawing practices.

This brings us to NATO AC301/D49, "Drawings (Engineering), Specifications, Lists and Associated Technical Data - Minimum Procedural Requirements for Multinational Programs. The cover and Table of Contents for the draft which is currently being reviewed by the NATO AC 301 members are shown in Figures 14 and 15.

Figures 16 and 17 are examples of the content of this proposed document. While the need to cover folding of drawing prints (Figure 16) may not be readily apparant, several NATO countries have existing standards in this area and, therefore, it becomes necessary to establish minimum requirements when print are exchanged between countries.

While many of you have not been aware of a standard covering folding of prints, I am sure that each of you is familiar with MIL-STD-143, "Order of Precedence of Specifications and Standards". But here the similarity stops for a multinational program. The picture changes quickly with the fact that you now have to deal with international standards and standards of other countries (Figure 17). The fact that it requires three pages to detail the requirements on the subject should give you some idea of the complexity of having to list the specifications and standards to be invoked on a multinational program. It became apparent during the preparation of this particular Chapter that some countries were not at all familiar with the use of order of precedence. However, they now recognize the importance of covering the subject in D49. D49 is stillin draft form--it cannot be used as a contractual document, but it does offer a springboard for requirements that must be considered as a part of a multinational program.

At this point I should like to return to Figure 1, the international standardization activities for engineering drawing practices. I would like to put in a pitch for your interest and participation in the technical advisory groups to review and comment upon ISO/IEC draft documents.

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IV-1 AStanP-2

PREFACE

1. SCOPE

The scope of Allied Materiel Standards Publication No. 2 (short title AStanP-2) is to:

(a) facilitate the understanding of technical drawings produced by different NATO nations.

(b) provide the information upon the status of international and national standards used in drawing practices and the inter-relationship of those standards.

2. DESCRIPTION

AStanP-2 is a document developed by the NATO Group on Materiel (ACSM) Standardization (AC/301); it identifies the international industrial standards on drawing practices and the various national documents tovether with the national deviations from the international standards.

3. AIM

The aim of AStanP-2 is to facilitate the understanding of drawings of member nations by giving a simplified description of drawing practices in NATO nations by charting the variations from the international practices recommended by the International Organization for Standardization (ISO) and the International Electrotechnical Committee (IEC).

4. USE

Designers and technicians in the field of defence materiel involved in bi-/multi-national projects, international co-production, development sharing and other forms of international co-operation, will have a tool to minimize the problems in the communication process by using AStanP-2 to understand foreign drawings.

5. IMPLEMENTATION

This publication is a guidance document and should be incorporated into national systems of defence standardization documents.

6. REVISION

AStanP-2 will be subject to annual revision by NATO Group on Materiel (ACSM) Standardization (AC/301).

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IV-1

Figure 13. Preface of AStanP-2

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NATO AC301/D49
SUPPLEMENT No. 2
Draft Dated 80-2-21

NOTE: This draft dated 80-2-21 was prepared by the U.S.Army Armament Research and Development Command for the U.S. Department of Defense, Defense Materiel Specifications and Standards Office for the NATO AC301 Committee, has not been approved and is subject to modification.
DO NOT USE FOR PROCUREMENT PURPOSES.

SUPPLEMENT No. 2

TO

DRAWINGS (ENGINEERING),

SPECIFICATIONS,

LISTS,

AND

ASSOCIATED TECHNICAL DATA

MINIMUM PROCEDURAL REQUIREMENTS

FOR

MULTINATIONAL PROGRAMS

SUPPLEMENT No.2 includes the following material:

FOREWORD (New)
TABLE OF CONTENTS (Revised)
CHAPTER 1 - GENERAL (Revised)
2 - ARRANGEMENT AND FORMAT (Revised)
5 - DRAWING PLAN (New)
6 - SET OF DRAWINGS (Revised)
14 - SPECIFICATIONS (New)
19 - GRAPHIC SYMBOLS AND DESIGNATORS (New)
25 - DRAWING FORMAT MATERIAL (New)
27 - INSPECTION OF DRAWINGS (New)
28 - VALIDATION/AUTHENICATION (New)
31 - FOLDING OF DRAWING PRINTS (New)
32 - NATIONAL CODES/REGULATIONS (New)
APPENDIX D - NATIONAL ISONET ORGANIZATIONS (New)

NOTE: For those chapters that were revised when a technical change or addition was made a revision bar is shown on the left side of the page.

NATO
UNCLASSIFIED

Prepared by
ARRADCOM for
DoD/DMSSO

Figure 14. Cover of Proposed NATO AC301/D49

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Figure 15. Table of Contents of Proposed NATO AC301/D49

CHAPTER 31

FOLDING OF DRAWING PRINTS (NON-REPRODUCIBLE COPY)

3101 DEFINITION

a. Folding of drawing prints (non-reproducible copy) is primarily limited to the need to transmit technical information in the form of a copy (print) of an original drawing or list.

1. NOTE: Original drawings and reproducible copies are always transmitted (or sent) either in FLAT or ROLLED condition "THEY ARE NEVER FOLDED."

3102 APPLICABLE NATIONAL DOCUMENTS

a. The following "NATIONAL" documents, of the latest issue in effect, include requirements that meet or exceed the minimum requirements as specified in this chapter.

1. Belgium - NBN 510
2. Denmark - DS 103
3. Germany - DIN 824
4. Italy - UNI 938-940
5. etc.

3103 INTERNATIONAL DOCUMENTS

a. The following "INTERNATIONAL" documents provide information that may be used to meet the minimum requirements as specified in this chapter.

1. ISO - Draft standards - Sizes and layout of drawing sheets and Folding of drawing prints

3104 MINIMUM REQUIREMENTS

a. Prints should be folded in such as manner as to:

1. provide for the title block (or supplementary drawing number) to appear on the top fold, preferrably in the lower right hand corner, for ease in reference and filing.

2. be no larger when folded than an A4 size (or A size) (210x297) sheet (folding module).

3105 SPECIAL CONSIDERATIONS

a. For uniformity in folding of prints, it may prove advantageous to show fold-line indicator marks on the drawing format, for manual folding or make use of mechanical folding equipment.

Figure 16. Proposed Chapter 31, NATO AC301/D49

CHAPTER 13

ORDER OF PRECEDENCE FOR THE SELECTION OF SPECIFICATIONS AND STANDARDS

1301 DEFINITION

a. A procedure which sets forth the order of precedence for the selection of specifications and standards to identify and describe items, material, processes and procedures used by design activities in the design and construction of military material.

b. SPECIFICATION - A document prepared specifically to support procurement which clearly and accurately describes the essential technical requirements for purchased material. Procedures necessary to determine that the requirements for the purchased material covered by the specification have been met shall also be included.

c. STANDARD - A document that establishes engineering and technical requirements for processes, procedures, practices and methods that have been adopted as standard. Standards may also establish requirements for selection, application and design criteria for material.

1302 APPLICABLE NATIONAL DOCUMENTS

a. The following "NATIONAL" documents, of the latest issue in effect, include the requirements that meet or exceed the minimum requirements as specified in this chapter.

1. United States - MIL-STD-143 (covers "National" documents only)

2. etc

1303 INTERNATIONAL DOCUMENTS

a. The following "INTERNATIONAL" documents provide information that may be used to meet the requirements as specified in this chapter.

1. As of this date - none have been reported

1304 MINIMUM REQUIREMENTS

a. Upon completion of the review of the design considerations, including but not limited to the provisions of the procedure outlined, specifications and standards required should be selected in an order of precedence. The selection of a specification or standard of lower precedence is to be made only when specifications or standards from the groups listed before it do not provide items technically or economically suitable for the application. The selection of a document within any one grouping of specifications and standards should be; a suitable standard, if any, over a suitable specification.

Figure 17. Proposed Chapter 22, NATO AC301/D49

CHAPTER 13

ORDER OF PRECEDENCE FOR THE SELECTION OF SPECIFICATIONS AND STANDARDS (Continued)

b. Multinational programs should implement an order of precedence for the selection of specifications and standards. The order should include, but not be limited to, the following:

1. Specifications and standards (program design activity documents) invoked by contractural application/provision which may contain documentation that is not standard or in specification form. Such listings should be organized in consonance with the requirements of the multinational program.

2. NATO documents (STANAG's and Allied Publications)

3. National Government/Military Documents

4. National Industry Association (Non-government) coordinated documents

5. National Government/Military and National Industry Association (Non-government) limited coordination documents

6. National Government/Military and National Industry Association (Non-government) non-coordinated documents

7. Foreign National Government/Military documents

8. Foreign National Industry Association (Non-government) coordinated documents

9 Foreign National Government/Military and National Industry Association (Non-government) limited coordination documents

10. Foreign National Government/Military and National Industry Association (Non-government) non-coordination documents

11. National company specifications and standards.

(a) COMPANY STANDARD - A company standard is a document that establishes company engineering and technical limitations and applications for items, materials, processes, methods, design, and engineering practices.

(1) All documents referenced in a company standard shall also be supplied and shall meet the same requirements as for a company standard.

NOTE: 1 - Not all of the groups are used by some countries.

2 - ISO and IEC standards may be included, as applicable, in any of the above listed groups.

Figure 17. Proposed Chapter 22, NATO AC301/D49 (continued)

CHAPTER 13

ORDER OF PRECEDENCE FOR THE SELECTION OF SPECIFICATIONS AND STANDARDS (Continued)

3 - It may happen that when listing specifications and standards for materials and processes the document selected may not fit the order of precedence used for the other specifications and standards.

c. Use of specifications and standards. Satisfactory operation of equipment procured under any specification or standard is the responsibility of the contractor, and the use of such specifications and standards listed for use by the organization concerned is in no way to be considered a guaranty of acceptance of the finished product.

d. Referenced specifications and standards should be submitted in accordance with the multinational program requirements.

e. Special Consideration

1. When the data produced by a contractor, subcontractor, and/or vendor of material, process, test, etc., is proprietary and essential to the engineering definition of the item(s), the equivalent or alternate National or Foreign specification and/or standard shall be noted on the drawing or list or the proprietary specification or standard should be identified as such and should be furnished as part of the engineering data.

Figure 17. Proposed Chapter 22, NATO AC301/D49 (continued)

GOVERNMENT PANEL

ON

TECHNICAL DOCUMENTATION

Chairman:

Mr. Vincent F. Mayolo
Defense Materiel Specification
and Standards Office

Panel:

Mr. John Kicak
U.S. Army, DARCOM

Mr. Russell Bain
U.S. Navy, Port Hueneme

Mr. Leonard Harshaw
U.S. Air Force, ASD, WPAFB

Mr. Harry Early
Defense Logistics Agency

Government panel discussions are normally not recorded in the proceedings; however the following presentations have been made available for publication:

Mr. Russell Bain O-1

Mr. Harry Early O-13

NAVSEA
MODULAR SPECIFICATION SYSTEM

by

Russell C. Bain
Naval Ship Weapon Systems Engineering Station
Port Hueneme, CA 93043

SUMMARY

The NAVSEA Modular Specification System (M-SPECS) is a computerized system for producing "tailored" technical manual acquisition specifications. The system is based on the use of standardized specification modules (requirements) which define the format, style, and content of the manual to ensure compatibility with the equipment, user, usage, and using environment.

The M-SPECS is being developed by the Naval Sea Data Support Activity (NSDSA), a department of the Naval Ship Weapon Systems Engineering Station (NSWSES), Port Hueneme, CA. System development is sponsored by the Naval Sea Systems Command (NAVSEA). The Naval Material Command (NAVMAT) has approved the implementation of the system on a Navy-wide basis.

Mr. Russell C. Bain, the author, is the Technical Task Manager of the program. He has a background of over 35 years in engineering and specifications and standards areas, both in industry and in the Government.

INTRODUCTION - Technical manuals comprise a vital logistic element necessary for optimum readiness of the U. S. Fleet, because they provide the information needed to operate and maintain ship systems and equipment. They also are the vehicles to train Fleet personnel in the use of equipment as well as provide information for advancement in rate.

Technical manuals must be accurate and understandable to the manual user. For various reasons, however, technical manuals are often inadequate to meet the user and Fleet needs. Navy management is greatly concerned about this problem and since specifications are essential to the acquisition of technical manuals, a continuing effort has been directed toward improving and tailoring technical manual acquisition specifications to fit the specific requirements and usage of the technical manuals. Most of this tailoring effort to date has been by manual means and, hence, labor intensive. With the advent of computerized data systems, however, it is now feasible to mechanize such tailoring through the concept and application of modularized specifications.

BACKGROUND - Within the Department of Defense there are over 200 specifications and standards, data item descriptions and other specification-type documents that relate to the acquisition and preparation of technical manuals. These documents contain requirements that are very similar in many respects, with nearly word-for-word redundancy occurring quite often. These documents exist because of the need to constantly revise or develop new requirements to cover peculiarities of differing acquisitions. As a result, there now exist many specification-type documents that attempt to cover the majority of situations but, in fact, prove to be an expensive compromise requiring considerable tailoring.

Some of the problems associated with the use of the existing specification documents are:

a. Incorporation by Reference. One of the major problems with present specification usage is the practice of citing all applicable referenced specifications in an effort to be certain that no needed requirement is omitted. These specifications, in turn, reference other specifications so that the result is to pile specification upon specification in a tier-like manner, burying essential and pertinent requirements deep within unrelated verbiage.

b. Redundant Proofs of Compliance. Once specifications have been cited, an elaborate system of checks is required to make certain that no possible applicable requirement is overlooked in the development of the technical manual. These redundant checks may concern only packaging, delivery, or other subsidiary aspects of the acquisition process, not the product itself; nonetheless, the impact on acquisition costs becomes significant.

c. Contradictions. Contradictions and/or omissions are common even in closely related specifications (such as a style and format specification and a content specification) which may be cited in an individual acquisition. A major problem is that the requirements in many seemingly related specifications actually contradict each other.

d. Management Requirements. Many nonproduct-related matters are incorporated into specifications which require expensive and elaborate management control systems. Often the reports generated by these systems are redundant and almost meaningless. Frequently, the reports are more complex than the product (technical manual) they are attempting to control.

e. Standards and Specifications. Due to lack of standardized requirements governing the development of technical manuals, many specifications tend to assume the place of standards and are often treated as such by the Government. The cumulative effect is to have almost 200 technical manual specifications vying with each other as invoking "standard" technical manual requirements.

f. Difficult to Tailor. DoD Directive 4120.21 "Specifications and Standards Application" serves as the directive for implementing policies and procedures for the tailoring of technical manuals. It defines tailoring as the process by which the individual requirements in specifications are evaluated to determine their suitability for a specific material acquisition and are modified, where necessary, to ensure that each invoked document states only the minimum needs of the Government. To effect tailoring of the existing specifications, various forms of intermediary documents (such as the Navy's Technical Manual Contract Requirement) are used to cite and interpret or modify the requirements contained in the applicable specifications.

g. Use of Intermediary Documents. The use of an intermediary document has not proven to be an effective or economical solution to the aforementioned specification application problems. The process requires considerable expertise on the part of all participants. The acquisition and logistic managers must be able to envision the type of manual the users need and, then, must invoke at least format and style and technical content specifications in precisely the right way. This becomes even more complex when quality assurance, printing, delivery, and other requirements and specifications are invoked. Not only must the acquisition and logistic managers be able to interpret specifications and standards to properly cite them in the tailoring process, but the preparer of the technical manual must also be able to interpret the specifications and standards the same way. And, of course, all parties involved must maintain all issues of all cited specifications to be responsive.

<u>MODULAR SPECIFICATION SYSTEM (M-SPECS)</u> - M-SPECS is an automated computer-based system of standardized specification elements that is modular in nature and designed to translate the characteristics of technical manual uses and users into procurement specifications. These specifications are tailored to the specific level, purpose, and end-use requirements for the most cost-effective acquisition and maintenance of technical manuals.

<u>Analogy Between Hardware and Data Acquisition</u> - To aid in introducing the M-SPECS concept, an analogy from the hardware field is appropriate and is depicted in figure 1. When a hardware designer goes to work, he has many standard hardware elements from which to describe the product he wants to build. He picks a material which is described by a standard and then he selects parts, also controlled by standards, such as, SAE standards for nuts and bolts, etc. By knowing the functional and physical performance requirements of the finished product, he can select from a wide range of standard elements to build a design specification that is appropriate for the finished product, such as sedans, vans, or pick-up trucks. The same situation exists in the design of houses, television sets, airplanes, ships, and weapons systems and equipment.

In the software field, however, and particularly in technical manuals, a far different picture is presented as shown in figure 2. There are no standardized elements. Many requirements are available but, unfortunately, they are buried in almost as many specifications as there are requirements. In addition, while there are strong similarities between the requirements in each specification, there is enough variation to keep them from being considered "standard." It appears that in most cases the variations are not essential, but occurred more for preference than any other reason. As a result, to locate and cite the appropriate requirements is extremely difficult, and to relate them meaningfully and consistently to user requirements is almost impossible.

One of the major features of M-SPECS can now be seen in figure 3. Based on the functional and physical requirements, a set of standardized technical manual elements can be developed from the present mass of specifications. Some of the possible element categories, with some of the probable elements, are shown. For example, under the heading of "form," standard elements would probably include hardcopy manuals, microform, etc.

In the same manner as the hardware designer, the technical manual designer can now examine his functional and physical requirements and, based on those requirements, select the appropriate standardized elements to build a design specification for the technical manual. Once again, as in the hardware field, these elements will provide specifications for all types of technical manuals--system manuals, equipment manuals, reference manuals, etc.

M-SPECS Concept - The M-SPECS concept is not limited to the provision of product specifications. Studies have shown that management requirements are a significant part of the overall technical manual acquisition problem. Within M-SPECS, the product requirements or elements which define the functional and physical characteristics are separated from the nonproduct requirements (see figure 4). The nonproduct requirements are those elements which define the management and control characteristics of the specification, such as, quality assurance, packaging, management reports, etc. These nonproduct requirement areas demand special attention because they become cost drivers through inadequate tailoring of specifications. Perhaps one of the major contributions of M-SPECS can be seen at this point. By separating these sometimes expensive nonproduct factors out into discrete elements, the manager need procure only the minimum necessary level of quality assurance, reporting, and related controls.

This is the basic M-SPECS concept. Simply stated, the Technical Manual Acquisition Manager determines both the functional and physical requirements along with the management and control requirements. This will lead to a well-defined set of requirements; i.e., a tailored technical manual specification.

M-SPECS Functional Diagram - The M-SPECS consists of four major components. (See figure 5.) First is the Front-End Analysis which completely defines the intended purpose and end users of the manual. The output of the Front-End Analysis is a comprehensive document detailing how the technical manual will function in its operating environment. This, in turn, becomes the input to the second major component, the Analytical and Decision Process. The process consists of a set of computer programs which relate the operational needs and requirements of the Front-End Analysis to specific characteristics of the desired technical manual, and then offer the appropriate requirements for the technical manual specification to meet the desired characteristics of the manual.

The third component, the Specification Generation, interfaces with a data base consisting of standardized modules to be used in formulating the requirements. This component calls forth the appropriate modules and contains the logic to organize the specification, format the pages, and incorporate required boilerplate material. The Data Base is the fourth component and contains the specification requirements modules appropriately coded for accession and control. The output of the total system is a tailored specification containing the requirements that best satisfy the comprehensive front-end definition of the purpose and use of the technical manual.

The following paragraphs explain in more detail the operation of the major components of M-SPECS.

<u>M-SPECS Front-End Analysis</u> - The Front-End Analysis provides the means by which the performance and use parameters and characteristics of the required manual are fully identified and documented. (See figure 6.) This component establishes the baseline data necessary for matching the manual to the equipment or system, the user, the job tasks, and the working environment. This task is accomplished by defining such factors as:

1. The type and complexity of the system or equipment.

2. The intended purpose of the manual - A comprehensive checklist is used to define the total scope of technical manual applications; e.g., is the purpose installation, maintenance, operation, or a combination of purposes?

3. The intended users of the manual - The users are identified in terms of their level of training, experience, rate, and skill level.

4. The environment in which the manual will be used - Factors such as lighting, vibration, climate, size of the work space, etc.

5. The maintenance concept - The level of repair, spare parts availability, and organizational level to be supported by the manual.

6. Extent and frequency of usage - Will the manual be used occasionally by a few users, or will it receive heavy use at hundreds of installation sites?

These factors, and other criteria as required, are described to the level of detail necessary to ensure that the total definition of the manual's application can be accomplished.

The output of the Front-End Analysis component is a Technical Manual Acquisition Requirements Checklist document which contains all the necessary information in a form suitable for input to the Analytical and Decision Process. In response to the data furnished in the checklist, the Analytical and Decision Process automatically analyzes, determines, and offers requirements that satisfy each item. Requirement selection is automated to reduce the labor-intensive efforts currently associated with manually preparing specification-tailoring documents such as the Technical Manual Contract Requirement used by Navy Commands in the acquisition of technical manuals.

The design logic governing the Analytical and Decision Process and the development of the sets of analytical and decision computer programs is the crucial step in overall development and success of the system. The design is based on the results of comprehensive analyses conducted to determine the optimum requirements for each aspect of technical manual design.

M-SPECS Analytical Decision Programming - There are three stages in the analytical and decision process. (See figure 7.) The first step matches characteristics of the user of the manual, the job tasks, and the work environment to appropriate data presentation formats and media. Other factors, such as maintenance philosophy, will also enter here. This process identifies the characteristics of a technical manual ideally suited to its purposes and use; however, there are constraints which limit production of the "ideal" technical manual. Cost and time are perhaps the most powerful of these constraints. Decision-making logic is built into the Analytical and Decision Process so that the requirements to be relaxed or dropped will have the least negative impact on the final technical manual. This is not to say that human judgment will not enter into the selection process. It is recognized that there will always be factors which cannot be captured in any computer program. Having defined the characteristics of the most suitable, realistic technical manual, the requirements are selected from a data base of standardized requirement modules. The output of this component is a set of requirements selection commands which cause the Specification Generation to access the appropriate specification modules.

M-SPEC Specification Generation Programming - Using the commands issued by the Analytical and Decision Process, the Specification Generation process accesses the requirements data base to gather the text and graphics which will actually appear in the final specification. (See figure 8.) The Data Base contains the modularized requirements refined from existing specifications and data item descriptions. The concept of separate data elements will allow the selection of each specific requirement or combination of requirements necessary to fulfill the specific needs of each manual procurement.

Having collected the necessary requirements, the Specification Generation component then organizes the requirements into sections to incorporate the required boilerplate material and to format the text on the page. The output of this component will be a complete, tailored specification to procure a technical manual which fully satisfies the needs defined by the front-end analysis.

M-SPECS Data Base - The data elements contained in the system's data base (figure 9) are the building blocks, discriminately selected, arranged in the proper order, and produced as a tailored technical manual procurement specification. These requirements reflect the two major categories of the technical manual requirements described previously: those that define the product and those that ensure proper management and product quality.

There are, of course, hundreds of product requirements that need to be analyzed and included in the data base. Only a few examples are indicated in figure 9. In similar fashion, examples of some of the nonproduct requirements are shown. While these requirements may not directly affect the actual manual, they can become a major factor in the total cost and will require the same careful analysis as the product elements.

M-SPECS Product, Tailored Specifications - The system will produce a sectionalized technical manual acquisition specification tailored to the specific level, purposes, and user requirements of each particular manual procurement. (See figure 10.) The specification will contain all requirements necessary to procure the manual. Reference to other specifications is not necessary.

M-SPECS BENEFITS - Implementation of M-SPECS is expected to bring benefits both in cost and effectiveness. A few of these benefits are as follows:

a. Eliminate redundancy, conflicts, or omissions from technical manual specification-type documents.

b. Accomplish standardization of types, format, and style of publications for use by NAVSEA.

c. Eliminate labor-intensive effort associated with present tailoring necessary in acquisition of manuals.

d. Ensure systematic analysis of requirements which will provide cost-effective specifications for acquisitions to meet NAVSEA needs.

e. Make technical manual acquisition process relate more closely to corresponding aspects of the hardware acquisition process.

f. Ensure accurate and usable specifications that are flexible enough for cost reduction and performance enhancements by control of QA configuration levels.

g. Provide systematic and cost-effective means of tailoring technical manual acquisition specifications.

h. Ensure that specifications are applied that comply with both NAVSEA and DoD policies.

i. Serve as a basis for possible expansion of M-SPECS concept throughout DoD.

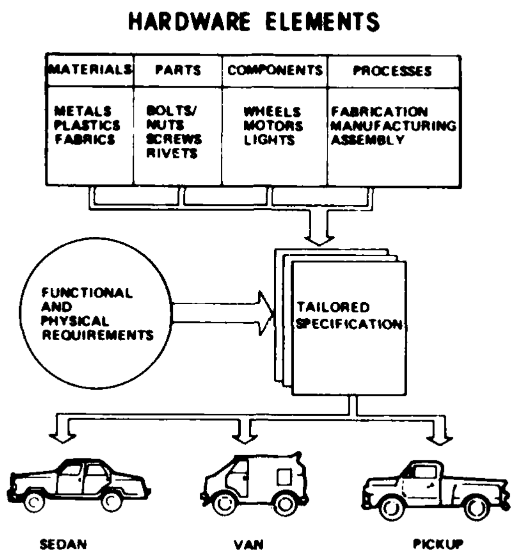


Figure 1. Hardware Design Elements

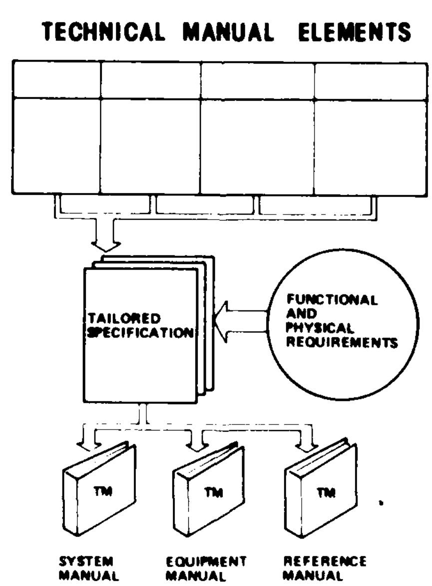


Figure 2. Technical Manual Design Elements

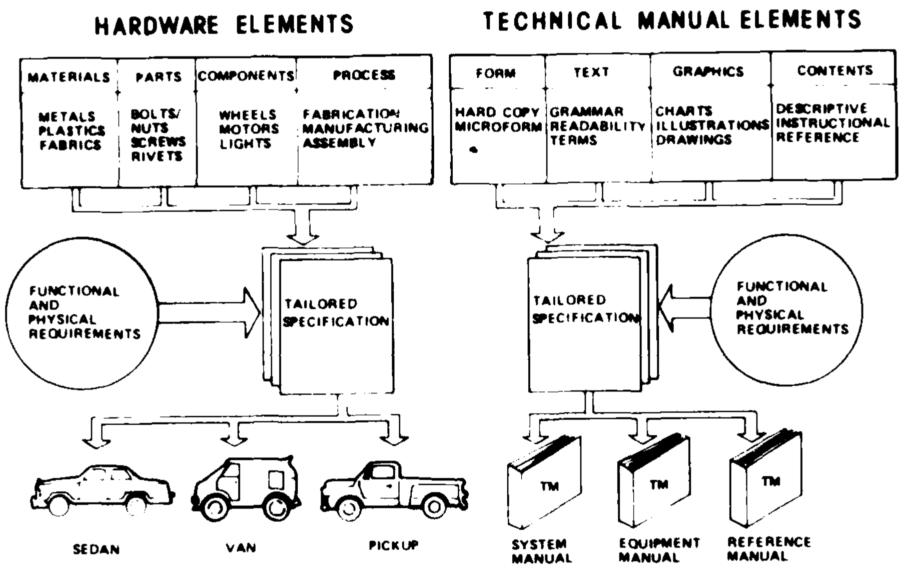


Figure 3. Hardware vs Technical Manual Design Analogy

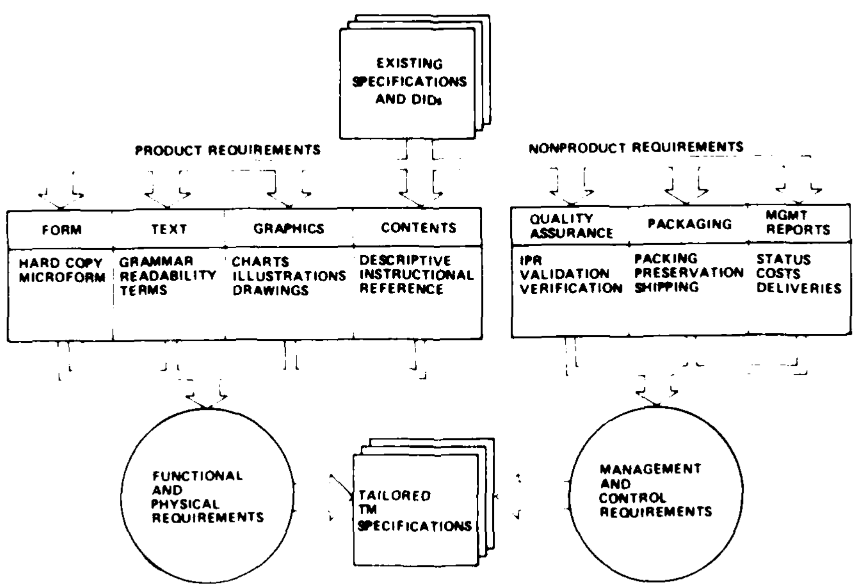


Figure 4. Product vs Nonproduct Requirements

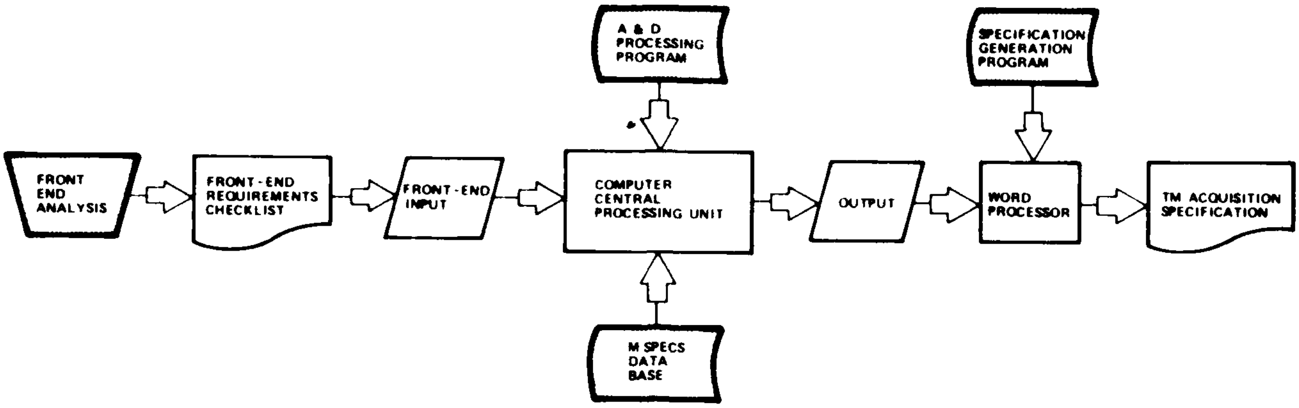


Figure 5. M-SPECS Major Components

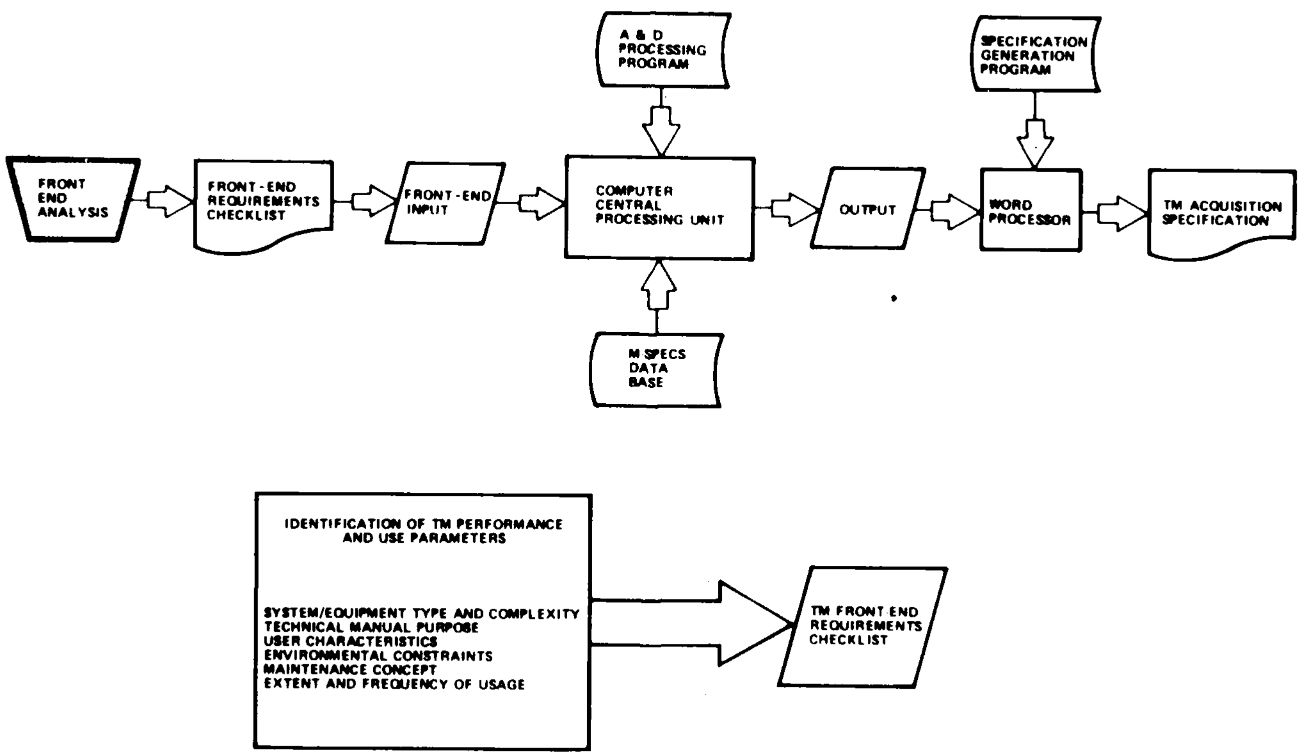


Figure 6. Front-End Analysis Requirements

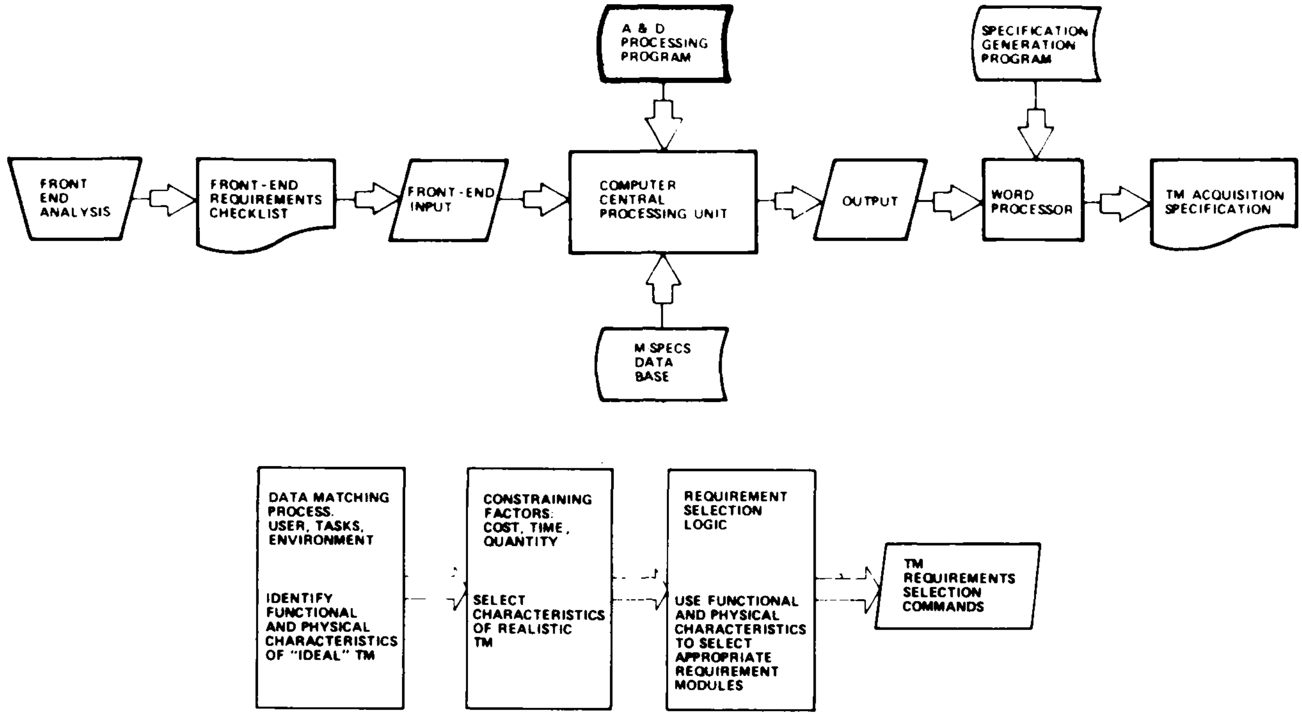


Figure 7. Analytical Decision Programming

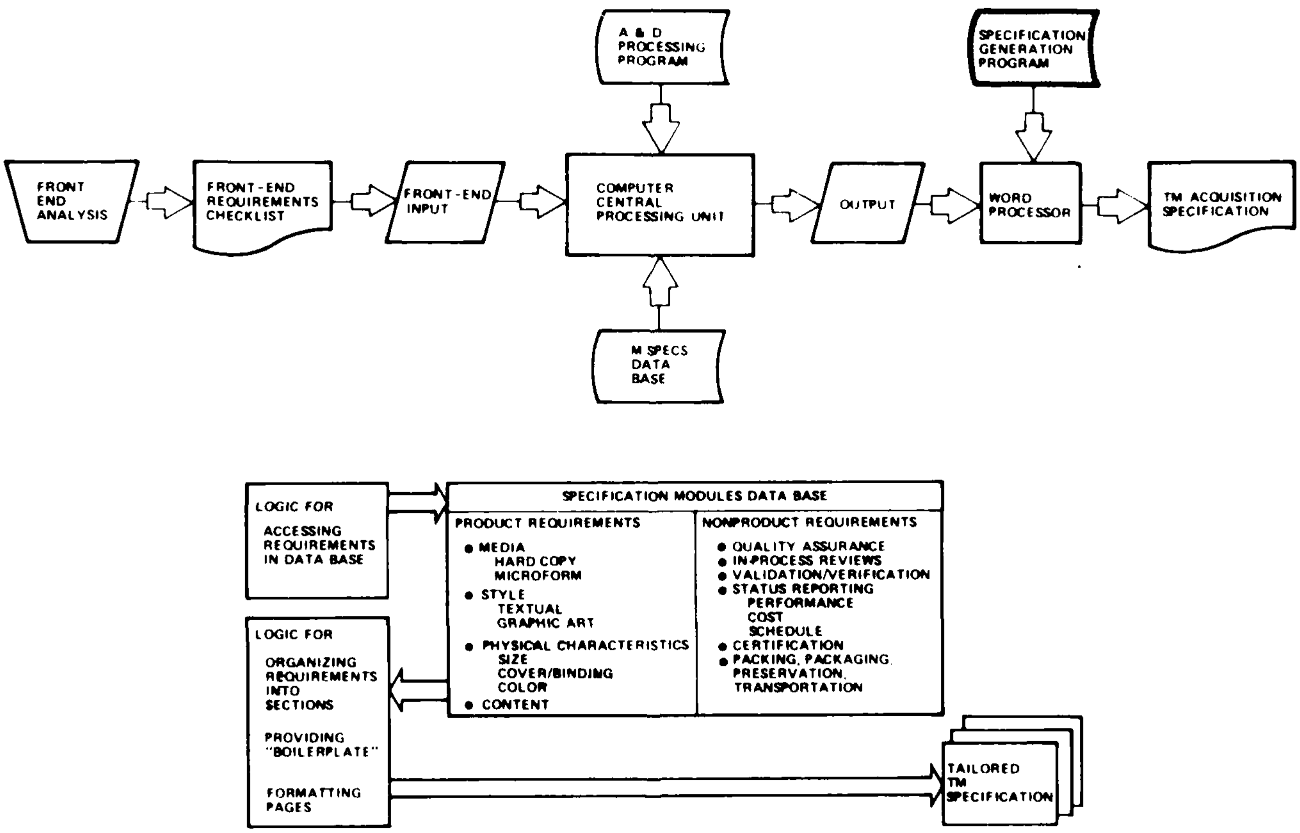


Figure 8. Specification Generation Programming

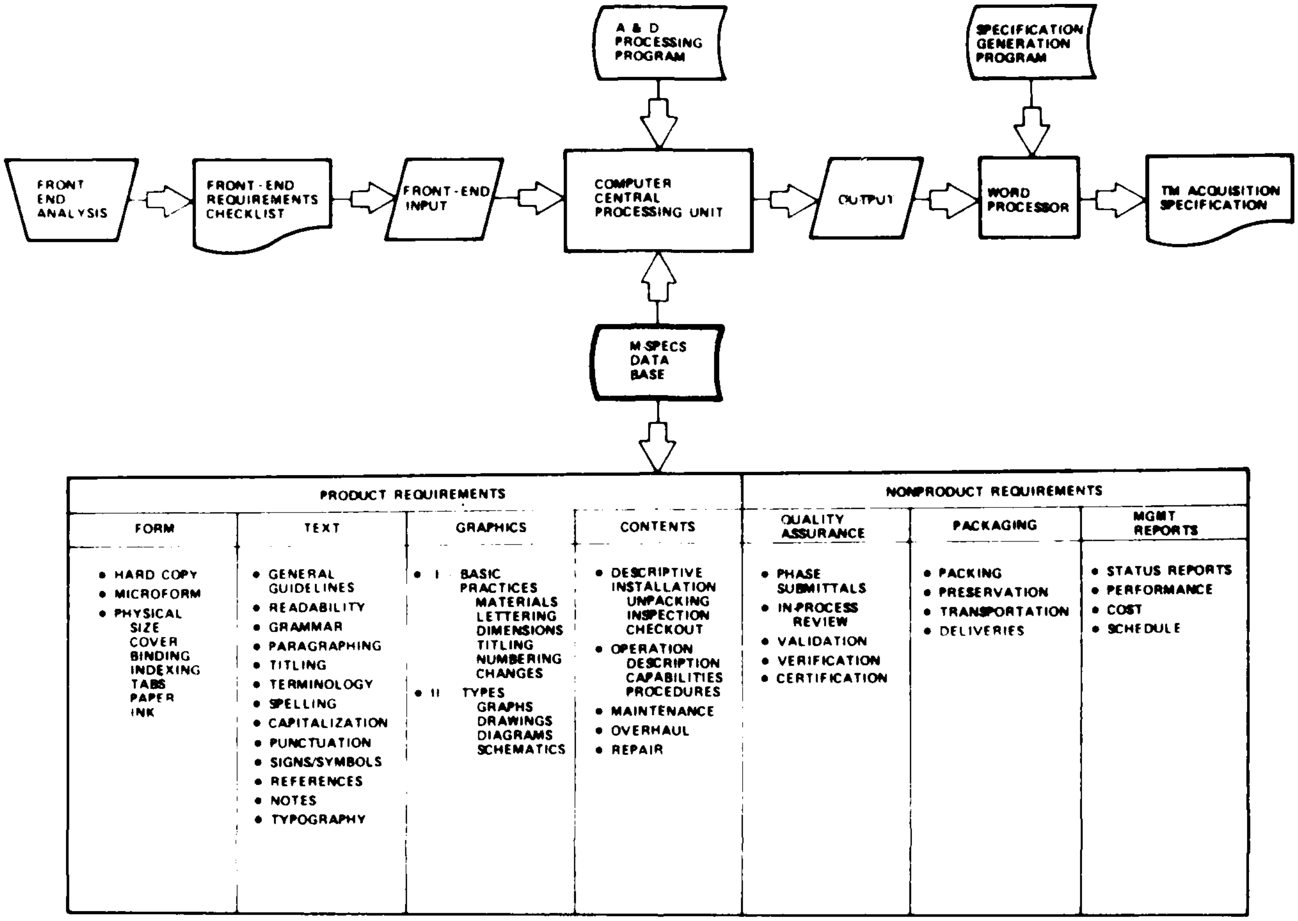


Figure 9. M-SPECS Data Base

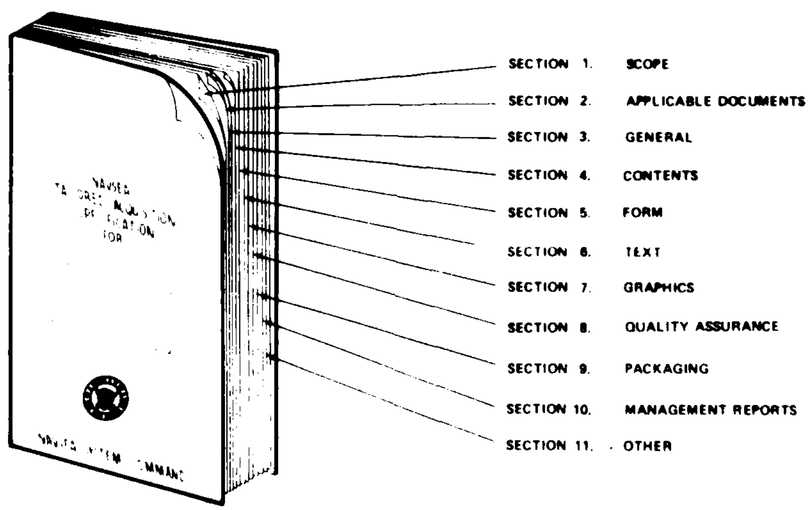
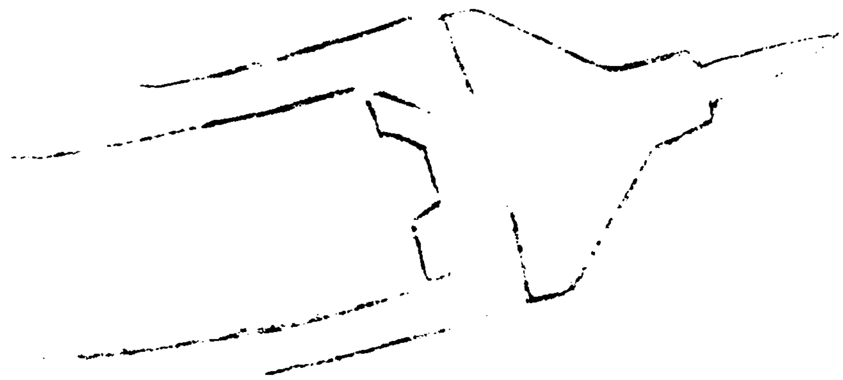


Figure 10. Tailored Acquisition Specification



DATA MANAGEMENT

DATA

INFORMATION

MANAGEMENT	SCIENTIFIC
ENGINEERING	COST
LOGISTICS	MANUFACTURING

AND OTHER

DATA REPORT & ESTABLISH CONTRACTUAL DELIVERY REQUIREMENTS

OBJECTIVES

- ENSURE CONTINUITY OF DATA
- CONTROL GENERATION OF NEW OR UNIQUE DATA
- ELIMINATE NON-ESSENTIALS AND DUPLICATIONS
- CONTROL TRACKING & PERIODIC REVIEWS
- RESPONSIBLE FOR TAILORING
- TO BE A TOOL FOR BETTER MANAGEMENT

DATA

MILESTONES	1970							1971												1972		
	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M
DATA CALL	△																					
DATA REVIEW BOARD			△																			
RFP RELEASE				△																		
AWARD OF DEF. CONTR.								△														
DATA MGMT REVIEWS									△			△										
CONTRACTOR PROPOSALS													△									
DATA REVIEW BOARD																△						
CDRL NEGOTIATIONS																	△					
ACQUISITION CONTR.																				△		
POST CONTR. REVIEWS																					△	△

S I G N I F I C A N T
CONSIDERATIONS

1. MANAGEMENT CONTROL
   - A. DATA MANAGEMENT PLAN
   - B. CHANGE CONTROL
   - C. CONTRACT DATA STATUS REPORT
2. ASSOCIATE CONTRACTOR RELATIONS
3. SUB-CONTRACTOR RELATIONS

MANAGEMENT CONTROL

DATA MANAGEMENT PLAN

- ORGANIZATION AND RESPONSIBILITIES
- DATA CONTROL
  - REQUIREMENTS DEFINITION AND ALLOCATION
  - PREPARATION AND SUBMITTAL
  - DATA REVIEW AND CHANGE CONTROL
  - STATUS REPORTING
  - SUBCONTRACTOR DATA MANAGEMENT
  - PROCUREMENT DATA MANAGEMENT
- SCIENTIFIC AND TECHNICAL INFORMATION

CONTRACT DATA STATUS REPORTING

A SINGLE AUTOMATED SYSTEM

TO TRACK AND ACCOUNT FOR

ALL DELIVERABLE DOCUMENTATION

SUBCONTRACTOR DATA

- SUBCONTRACTOR DATA REQUIREMENTS LIST (SDRL)
  - UNIQUE DATA ITEMS
  - SCHEDULE
  - QUANTITY

CONTRACTUAL PROVISIONS

1 TOLERANCES TO DISTRIBUTION

2 DEFERRED ORDERING

3 RIGHTS IN TECHNICAL DATA

4 WITHHOLDING PAYMENTS CLAUSE

(AMSDL) (A) DOD 5000 16L
ACQUISITION MANAGEMENT SYSTEMS & DATA REQUIREMENTS LIST

(AMSDM) (B) DOD 5000.32
ACQUISITION MANAGEMENT SYSTEMS & DATA REQUIREMENTS MANUAL

(C) AFR 310-1
MANAGEMENT OF CONTRACTOR DATA

(D) DAR - DOD DOCUMENT WHICH IS THE VERSION OF THE OLD ASPR.

(E) AFSCR/AFLCR 172-7
BUDGETING & FUNDING FOR PROVISIONING DATA

(DID) (F) DD FORM 1664 - DATA ITEM DESCRIPTION

(CDRL) (G) DD FORM 1423 - CONTRACT DATA REQUIREMENT LIST
(CONTRACTUAL DOCUMENT FOR DATA DELIVERED)

(H) AFLC FORM 364 / AFSC FORM 40
CONTRACT DATA REQUIREMENT SUBSTANTIATION (JUSTIFICATION FORM)

(I) RFP - REQUEST FOR PROPOSAL

(J) AFR-67-28
ENGINEERING DATA DISTRIBUTION AND CONTROL

MORE SPECIFICALLY

WE NEED TO KNOW!!

WHAT DOCUMENTS ARE REQUIRED?

WHEN SHOULD THEY BE DELIVERED?

WHO WILL PREPARE THEM

AND

ARE THEY GOING OUT ON TIME?

ARE APPROVALS BEING RECEIVED?

Workshop #1 - Data Management

General - This workshop convened in two sessions: The first, dealing with pre-selected topics which had been identified for action by the Data Management Section of the Technical Documentation Division; and the second, providing a forum for the mutual discussion of problems and questions being faced today in the Data Management community. Of the 58 attendees, 21 were from various elements of the DOD and 37 from a variety of industrial companies; this 35/65% ratio provided a broad base from which valid conclusions could be reached. The Discussion Session utilized the knowledge and expertise of an experienced panel who provided the initial responses to the questions and discussion topics generated by the workshop participants. This panel consisted of:

Mr. H. L. Atkins	EG&G
Mr. Vince Mayolo	DOD/DMSSO
Major Phil Merkley	AFSC/SDDS
Mr. Al Signor	NSWSES

Action Item Session - Reports on sub-committee efforts this past year on actions previously identified included the following:

a. Consensus Standard DIDs - Mike Michaelis, (USN) CBC and Al Brand, Raytheon Service Company, reported on this task involving the review of 27 DIDs dealing with Commercial Technical Manuals (i.e., Technical Manuals associated with the operation and maintenance of "commercial" equipment). Following considerable analytical and editorial effort, a single consensus DID has been identified which should be usable in lieu of the 27 DIDs reviewed. This consensus DID is attached to this report and will be forwarded to the responsible Government agency via DMSSO for consideration and official action. Workship discussion brought out a number of questions relative to the appropriate source document associated with this DID and whether the application of a DID to a manual for off-the-shelf equipment made the manual "non-commercial". These questions will be addressed in the letter which recommends acceptance and use of the consensus DID.

b. DD Form 1660 - Paul Courtoglous of AFSC/ESD reported on his committee effort to consider the utility of the DD Form 1660, Management Systems Summary List. Of the 11 questionnaires returned, all but one could see no advantage in using this form. Generally, it was considered not to be cost effective as viewed by both the government and industry. Recommendations are: (1) do away with the form; and (2) do not combine with the DD Form 1423. These will be forwarded to DMSSO for consideration.

c. DD Form 1423 CDRL Recommendations - One session was spent considering what changes/improvements to the basic CDRL form might be in order after many years of faithful service. A number of suggestions had been received by the Section Chair this past year and these were provided to those assembled for consideration:

(1) "Can DD 1423 be revised to provide for partial shipment of a data item without getting a separate DD 250 with each partial

shipment?" Even though Block 16 says "partial shipments with letter of transmittal" we still get DD 250s with partials. If form is revised maybe DCAS will comply (also contractors).

(2) What can be done to marry the DD 1423 with the AMIS forms 708/709?

(3) Block 9 is rarely used - why not delete or use for another purpose?

(4) Block 11, when used, is rarely filled in correctly and different organizations use it differently. The block should be removed or better instructions on its use provided.

(5) Block 14 should provide a column for delivery of "draft" copies. Many times the quantities of draft vs. final copies are different, necessitating the writing out of instructions in Block 16; suggest larger block with two (2) columns, one for draft and one for final.

(6) Block 16 needs expansion to provide more space for supplementary instructions.

(7) Prepared by - approved by blocks. Provide specified instructions that the DMO will sign one of these blocks. Many times 1423's are filled out incorrectly and the DMO has not been given the opportunity to review the form prior to being placed on contract. This happens frequently on contract modifications and amendments. This would strengthen the DMO position and the DM discipline. The existing regulation just states, "use to be specified by DOD component".

These questions initiated a lively discussion and prompted others. In order to arrive at some specific recommendations it was decided to break into smaller groups.

d. The workshop then divided into three groups to identify specific recommendations for improvements in the general areas of: (1) CDRL adminstration; (2) interface activity changes; and (3) involvement with the computer world - led, respectively, by Len Harshaw, ASD; George Rice, ASD; and H. L. Atkins, EG&G.

(1) CDRL Administration - All 16 blocks of the DD Form 1423 were considered and most were found to be satisfactory as is. However, it soon became evident that many blocks utilize acronyms and abbreviations and these are not only not standard within DOD, but also they vary widely within Commands. This Section agreed to take as an action item a spearheading effort to attempt to get consensus CDRL acronyms and abbreviations agreed upon and sanctioned for use throughout the DOD community. Other block recommendations identified are:

Block 1 - alpha/numeric code with alpha being the exhibit letter - suggest that rather than using the A00A numbering system, use A010 through A999.

Block 6 - The responsible technical office be the sign-off office on any DD 250 (not a unanimous recommendation)

Block 9 - Delete, or use for some other purpose

Block 15 - Final total only - recommend preliminary total be listed in Block 16

Block 16 - Recommend that block be enlarged

(2) Interface Activity changes - It was recognized that many of the CDRL problems arise out of other regulations/directives etc. Time did not permit an analysis of all of these, nowever, it was noted that there is an unfortunate increasing use of the DD Form 250 in delivery of all kinds of data and relatively minor alternations of interfacing documents would result in saving a lot of money:

(a) AFR 310-1 - Delete all references to use of DD 250 codes such as "S" for source and "D" for destination in Block 7 of DD Form 1423. Instructions should state submission of data will be on a letter of transmittal (LT), and Block 7 of DD 1423 annotated "LT".

(b) DAR 16-815, subparagraphs (c) and (d) references to the use of a DD Form 250 in Block 7 of the DD 1423 should be deleted.

A statement should be made in subparagraph (c) requiring the use of a DD Form 250 only for such data items as drawings/documentation entering into the government depository; final authenticated product specifications; and submission of final approved Technical Orders (TOs) negatives, and software data such as magnetic tapes, etc. Subparagrph (d) should be rewritten to state there will be one Contract Line Item Nubmer (CLIN) for each lot of Contract Data Requirements List (CDRL) data identified as an attachment or an exhibit. The DD Form 250 shall be required upon completion of all data items for that CLIN. This paragraph should also reference the requirement for a separate DD 250 for delivery of software documentation. This shall be listed on a separate CLIN or as a subline item to the appropriate CLIN.

(c) DD Form 1423 - Block 7, delete reference to DD 250 required. Data items such as specs and TOs referenced in above paragraph 2, shall have a remark in Block 16 of DD Form 1423 stating a DD 250 shall be submitted to the PCO at time of final delivery for these data items. Use of inspection codes or acceptance codes (S&D) shall also be identified for use on the DD 250. As an example, Block 16 remark for drawings required on microfilm aperture cards to be forwarded to AFALD/PTD, OOALC, and ASD/TAM-C, would read: "The contractor shall deliver one set of mounted master microfilm aperture cards (MACs) to AFALD/PTD, and one set each of duplicate aperture cards (DACs) to ASD/TAM-C, and OOALC/MMEDD, 60 days after PCA. A DD Form 250 shall be completed with inspection at source(s) and acceptance at destination (d), and forwarded to ASD/TAM-K, WPAFB".

Since Block 7 would be annotated "LT", submissions of data would be by letter of transmittal with the DD Form 250 only forwarded to ASD/TAM-K.

(3) Computer Involvement

An adhoc committee was established to study the feasibility of standardizing the data entries in Blocks 1 through 15 of the DD Form 1423, Contrct DAta Requirements Control List. In addition, the committee will address the problem of establishing a standard (either government or indistry) that would encompass standardized computer programs for use with the DD Form 1423 that may be used by the government and industry to track status of data requirements on a real time basis. Constraints to be considerated include:the coding shall be man readable, the program may be used with all types of computers from the most complex to the least complex (Radio Shock) so as to accommodate the small contractor as well as the major contractors.

Discussion Session - Questions generated from the floor and from inputs received by the Section Chair this past year were fielded initially by the panel, and in most instances, resulted in a lively discussion by workshop participants. Although many questions elicited other related questions/ comments, only those officially submitted to the Chair are reported here.

Question 1 - What resources are available to a contractor attempting to establish a Data Management system? Answer: Very little. He can avail himself of the Data Management course at WPAFB where limited numbers of industry personnel are permitted to attend; some textbooks are available.

Question 2 - How can the importance of the Data Management function in the Federal Government be shown/demonstrated? Answer: Lacking a uniform appreciation of this effort in the higher echelons, there is little to suggest except exemplary effort on the part of the personnel so assigned.

Question 3 - Is there a career field for Data Managers in the Federal Government? Answer: There is an effort to try to establish a Civil Service discipline, but no real definition of duties of data management has been established.

Question 4 - What can be done about the problem of overlapping, redundant, obsolete, superfluous, vague, and conflicting specifications? Answer: Realizing that there are over 40,000 specs, there is a need to address the specific ones which are giving the problems. One of the major problems is tiering, which is in the process of being resolved. DODD 4120.21 revision will address this.

Question 5 - If DOD goes commercial, how will Technical Data Management be affected (DIDs, Regs, etc.)? Answer: OMB Circular A-109 probably instigates this problem. There is no total answer at this time.

Question 6 - Impose a requirement that immediately following the award of all contracts which includes delivery of data (CDRL), a data call meeting be scheduled between the procuring organization and the recipient of the award to discuss any proposed revisions, deletions, or when required,

additions to said data requirement." Answer: Data Manager should be a part of the negotiation.

Question 7 - What is Data Manager's responsibility relative to the technical content of the CDRL data for which he is accountable? How does he assure that it conforms to the contract? Answer: He depends on support from his technical people who required the data. He is not all knowing, but he knows whom to depend on.

Question 8 - How should industry handle the problem of a weak CDRL? Answer: Review with Procurement Data Manager to ensure a good understanding of the requirements.

Question 9 - What should the Data Manager's role be in the preparation of contracts? The S.O.W.? Answer: His knowledge of the various requirements for data will permit him to ensure the contract details the requirement for his data. He will ensure tasks will be in the work statement, not the DID.

Question 10 - What are the best things to be done to effectively handle "rights in data"? Answer: Consult the DAR. This explains what the contractor is to do and government responsibility in all instances.

Question 11 - How can Data Managers be better encouraged to expand their horizons to specs/standards when time is filled with just "data"? Answer: He should look at the data requirements needed for a spec/standard. Make recommendations on modifications or generation of an appropriate DID.

Question 12 - What specific steps are being taken to eliminate duplicative DIDs? Answer: Whenever a spec is being reviewed for update, the appropriate DIDs will be reviewed to standardize the DID.

Question 13 - Where would one find guidelines for tailoring DIDs for individual procurements? Answer: A revision to MIL-STD-962 is forthoming that will assist in tailoring a DID.

Question 14 - How do you best handle the problem of contracting for rights-in-data on the combination commercial (existing) and development item? Answer: Predetermination of Rights is necessary here before signing a contract.

Reprise - The discussions were pertinent, the participantes were active and knowledgeable, and the action items identified will be pursued during the coming year.

John Hart

John R. Hart
Chairman,
Workshop #1 Data Management

This draft, dated 6 June 1980, prepared by Naval Construction Battalion Center (Code 156), Port Hueneme, CA 93043 (YD), has not been approved and is subject to modification. DO NOT USE PRIOR TO APPROVAL. (TMSS-)

PROPOSED MIL-STD-
6 June 1980

PROPOSED MILITARY STANDARD

MANUALS, TECHNICAL, MODIFIED COMMERCIAL

TMSS

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1. SCOPE

1.1 Purpose. This standard establishes the technical requirements for commercial manuals modified to meet military requirements in support commercial equipment acquired by the Department of Defense (DOD). This standard is not intended to standardize the style, format, size, or contents of commercial manuals.

1.2 Application. Commercial manuals with the required supplemental information are operator, preventive, and shop maintenance instructions which enable an average journeyman technician or mechanic without prior knowledge of the specific type, make, or model to operate, service, maintain, and repair the equipment.

2. REFERENCED DOCUMENTS

2.1 Other publications. The following documents form a part of this standard to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

CATALOGING HANDBOOK H4-1, Federal Supply Code for Manufacturers (Name to Code)

a. Copies of handbooks should be obtained from the procuring activity or as directed by the contracting officer, from the DOD Single Stock Point, Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

3. DEFINITIONS - Not Applicable

4. GENERAL REQUIREMENTS

4.1 Technical manuals. Technical manuals shall cover each specific make, model, year and serial numbered piece of equipment scheduled for delivery under terms of the contract. It is the intent of these requirements to use standard commercial manuals modified, as necessary, to meet the minimum specifications set forth herein. The manuals shall provide instructions, illustrations, and other associated data for operations, maintenance, and repair, including a complete catalog of parts used in the repair of the end item. The manuals provided shall contain instructions and information as set forth below for all equipment components, assemblies, subassemblies, attachments, and accessories manufactured by the prime contractor or those purchased by the prime contractor from other sources and assemblied in the finished end-item.

4.2 Prime contractor responsibility. The prime contractor is responsible for providing the technical publications specified above for all of the components, assemblies, subassemblies, attachments, and accessories whether the item was manufactured and assembled in-house or obtained by the prime contractor from other sources. An assertion by the Prime Contractor's component/parts supplier that Repair and Parts Manual data is not available for a repairable item is not an acceptable reason for the contractor not to provide the technical manual data required by this specification.

4.2.1 Separation of volumes. Manuals may be in separate books or volumes consistent with the contractor's standard commercial practice. Manufacturer's manuals or data for components, assemblies, subassemblies, etc., which are provided as part of this contract, shall be assembled and bound securely into a manageable volume or volumes and will be indexed by major assembly and component in sequential order. Where practicable, all drawings and instruction sheets should not exceed a single foldout sheet.

4.2.2 Table of content. A table of contents shall be made part of the assembled publication set, and pen and ink changes or rough penciled diagrams or illustrations normally furnished with the preliminary draft will not be acceptable in the finished product.

4.3 Supplements. Supplements to manual may be prepared for the purpose of (1) isolating classified information, (2) providing additional new data expediently, (3) providing additional data to make a commercial manual complete for military use or, (4) augmenting the data in an existing military manual to extend the coverage to another equipment, model, or modification.

4.4 Approval and changes. Change sheets or revised manuals shall be required if any component, assembly, subassembly, attachment, or accessory of the equipment is changed subsequent to delivery and acceptance of the approved technical manual. These change sheets or revised manuals are required after determination of changes to components, etc.

4.5 Parts manual. The contents of the parts manual shall provide positive identification and coverage for all of the parts of components, assemblies, subassemblies, accessories, and attaachments normally subjected to wear, malfunctioning, damage or loss. Common hardware items such as mild steel bolts, nuts, washers, cotter pins, and the like may be omitted.

4.6 Binding. When specified in the contract, each volume of the technical manual set shall be securely bound in a durable, hard covered, water-resistant binder.

4.7 Cover sheet. The cover sheet or binder of each volume of the technical manuals shall be identified and marked as follows:

a. Equipment manufacturer and/or contractor's address.

b. Contract number.

c. Equipment identification, make, model, serial number, Military number of the equipment, and stock number if provided by the Government.

d. Volume number and title of the manual.

e. DOD Component Manual Numbers, if provided by the Government.

4.8. Security classification. When required, the security classification of a manual shall be as designated by the bureau or agency concerned. The applicable classification shall constitute a part of the contract and the classification features shall be identified and indicated. Contractor responsibilities shall be clearly defined. Whenever possible, volumes or sections of the manual not specifically requiring security classification, shall not be classified.

5. DETAIL REQUIREMENTS

5.1 Contents. The contents of a complete set of technical manuals shall include, as a minimum, the following:

a. Operating instructions.

b. Maintenance, service, and repair instructions.

c. Parts list, illustrated.

d. Charts, diagrams, and schematics

e. Installation, erection, and assembly drawings, and/or instructions (required only when equipment is shipped disassembled).

5.1.1 Operating instruction. The contents of the operator's manual shall include specific instructions and illustrations of the equipment operation as follows:

a. Describe the equipment and its purpose.

b. Include instructions for unpacking, inspecting, and installing the equipment.

c. Operator prestart checks, lubrication, and service requirements.

d. Starting procedures and controls in step-by-step tabular form.

e. Operations of the basic machine, attachments, and accessories.

f. Turn On, Operate, Turn Off procedures given in step-by-step tabular form.

g. Safety precautions to be observed while operating under all operating conditions for which the equipment was designed.

h. Operator service requirements during operations.

i. Precautionary notes emphasizing instructions to prevent damage
to equipment or injury to personnel shall be inserted in the manual immediately prior to the procedural text in which the danger is specified. The precautionary notes shall be headed "WARNING" when the danger is injury to personnel and "CAUTION" when the danger is damage to equipment. "WARNING" AND "CAUTION" notes shall be capitalized, indented, and surrounded by a solid border to provide contrast with the rest of the test material.

5.1.2 Maintenance, service and repair instructions. The contents of the shop or maintenance manual shall include all necessary instructions that will enable an average skilled mechanic, without prior knowledge of the specific type, make or model of equipment, to maintain the equipment in a safe and serviceable condition. It should be emphasized that the equipment will be serviced and repaired in Government shop facilities and many cases, at remote locations throughout the world, without access to manufacturer or dealer facilites. Therefore, the maintenance or shop manual shall contain all necessary instructions, illustrations, charts, diagrams, and schematics covering the following as a minimum:

a. Lubrication instructions shall include:

(1) Table showing recommended lubricants for specific temperature applications.

(2) Chart with schematic diagram of the equipment showing lubrication points, types of lubrications, service intervals, and capacities.

b. A table of preventative maintenance instructions including frequency in time, miles, or hours covering routing servicing, lubrication and adjustments.

c. Testing, troubleshooting, and repair guides and diagnostic techniques that will enable prompt isolation of the cause of malfunction with corrective maintenance instructions. Include instructions for operational testing of equipment without aid of an auxiliary such as second terminal, and instructions for testing and troubleshooting, in operational position, by communicating with a remote terminal.

d. Instructions for removal, replacement, disassembly and assembly of all components, assemblies, and subassemblies, and accessories and attachments normally subjected to wear, damage and/or malfunctioning. The replaceable parts in general will consist of the equipment itself, external cable with connectors, and all mechanical parts such as knobs, fuses, handles, etc., either on the outside of the equipment or immediately accessible from the outside. Include Group Assembly Parts Breakdown and supporting, perspective exploded view drawings of the parts, accompanied by a series of written paragraphs containing step-by-step instructions telling how to replace the parts that <u>organizational maintenance personnel</u> are permitted to replace.

e. Maintenance and repair data, i.e., tolerances, dimensions, settings and adjustment, normally required for performing routine maintenance servicing, including removal, replacement and reassembly of components, assemblies, subassemblies accessories, and attachments normally subject to wear,'damage, or malfunctioning.

5.1.3 <u>Parts manuals</u>. Parts manuals may cover more than one model or series of equipments, components, assemblies, subassemblies, attachments or accessories, such as master parts catalog, in accordance with the contractor's standard commercial practice or option. Deletion of part numbers not applicable to equipment under the contract is not necessary, provided those parts applicable to equipments being furnished are clearly identified in the manual provided. Identification of the parts shall be such that all parts may be ordered and centrally stocked by the government witout further identification to the make, model, and serial number of the equipments being provided under the contract.

5.1.3.1 <u>Illustrations</u>. Clear and legible illustrations, drawings and/or exploded views shall be provided to identify all individual parts, components, assemblies and subassemblies of the end item. Part numbers and description shall be shown on illustrations or listed separately. When the illustrations omit the part numbers and description, both the illustrations and separate listings shall show the index, reference, or key number which will

cross-reference the illustrated part to listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies with individual parts identified to the assembly.

5.1.3.2 Contractor part numbers. The prime contractor's part numbers shall be included for parts for which he has proprietary rights, exercises design control, and for which he is the logical supplier. The prime contactor shall also assign numbers to purchased production parts, if such parts are altered to meet the prime manufacturer's design configuration. (Repainting, marking, or other nonsignificant operations are not adequate cause for use of exclusively assigned numbers).

5.1.3.3 Manufacturer part numbers. Components, assemblies, subassemblies/parts, purchased by the prime contractor for which the prime contractor does not have design control, shall be identified by the actual manufacturer's name and part numbers. Detail parts in a prime contractor's assembly, as well as attaching parts, for which the prime contractor does not have design control shall be identified by the applicable actual manufacturer's part numbers. This paragraph does not restrict prime contractors from assigning their part numbers as long as the actual manufacturer's part number and FSCM or manufacturer is shown.

5.1.3.4 Cross-referencing. Contractor may elect to append an annex of cross-reference numbers to implement 5.1.3.2 requirements when implementation in manual form varies drastically with the style, format, and method of contractor's standard commercial practice. The parts list shall include electrical ratings of the circuit elements and the manufacturer's identification number.

Subject cross-reference in an annex will appear in the following format:

Contractor's Part No. Alpha Numeric Seq.	Actual Manufacturer Name and/or Code*	Actual Manufacturer's Part No.
100001	John Doe & Co. 00000	2000002

*A five-digit code found in the Cataloging Handbook H4-1, Federal Supply Code for Manufacturers (Name to Code)

Custodians:

Army - TM
Navy - SH
Air Force - 16
Defense Supply Agency - CS

Preparing Activity:

Navy - YD

Project No. TMSS-

Review Activities:

Army - AT, AV, EL, ME, MI, MU, TM, WC
Navy - AS, EC, MC, OS, SH, TD
Defense Supply Agency - GS, CT

Workshop #1 - Data Management

Attendees

Herb Atkins Panelist	EG&G Rockville, MD
Edward F. Averi	GTE Products Corp Needham, MA
Richard Baker	Smith and Wesson Springfield, MA
Richard Bartley	FMC/Northern Ordnance Division Minneapolis, MN
Ed Bastek	Motorola Scottsdale, AZ
Ray Beckingham	Hughes Helicopters Culver City, CA
A. M. Bisceglia	Interstate Electronics Corp Anaheim, CA
James M. Black	ASD/RWCW WPAFB, OH
David Blackstone	Ingersoll Rand Company Painted Post, NY
John Bowers	Northrop Services Inc. Arlington, VA
Al Brand	Raytheon Service Company Ventura, CA
Perry T. Brixey	Aerospatiale Helicopter Corp Grand Prairie, TX
M. F. Casey, Jr.	McDonnell Aircraft St. Louis, MO
Charles Cattaneo	Martin Marietta Corp Orlando, FL
Ray Chaisson	Aerojet Electrosystems Company Azusa, CA
John W. Chesney	Fourdee Division of Emerson Electric Casselberry, FL

Harvey W. Cook	Northrop Corp Hawthorne, CA
Paul Courtoglous	AFSC/ESD Hanscom AFB, MA
D. C. Derosia	General Electric Company Bridgeport, CT
Darlene Duerden	DRDME-DE Fort Belvoir, VA
R. M. Eggen	TRW-DSSG Redondo Beach, CA
Tom Eigel	Northrop Defense Systems Division Rolling Meadows, IL
John Endicott	General Dynamics Convair Divison San Diego, CA
Kevin Fanning	HQ AFCMD/EPX Kirtland AFB, NM
Victor Fredette, Jr.	US Naval Ord Station Indian Head, MD
John J. Gray	Stencel Aero Engr Corp Asheville, NC
Pat Hahn	DRDME-DE Fort Belvoir, VA
Len Harshaw	ASD/AFAC WPAFB, OH
John R. Hart Chairman	Boeing Aerospace Company Seattle, WA
William J. Heim	Naval Weapons Center China Lake, CA
Frank G. Holmes	TRW Redondo Beach, CA
George Hromnak	HQ-ARRADCOM Dover, NJ
Walker Jackson	Pratt and Whitney Inc W. Palm Beach, FL
Charles W. Jones	Harry Diamond Labs Adelphi, MD

Talmedge E. Jones	Harris Electronic Systems Melbourne, FL
Stephen R. Kauffman	Naval Ordnance Station Indian Head, MD
William D. King	Naval Air Systems Command Washington DC
Vince Mayolo Panellist	DMSSO Falls Church, VA
Maj. Phil Merkley Panelist	HQ AFSC (SDDS) Andrews AFB, MD
Mike Michaelis	CBC Port Hueneme, CA
W. A. Moran	Douglas Aircraft Long Beach, CA
Vincent A. Ness	Vought Corp Dallas, TX
Jim Remiker	General Dynamics Convair Division San Diego, CA
George J. Rice	ASD/TAM-C WPAFB, OH
Nancy Richardson	Hughes Aircraft Company Culver City, CA
Oswald Rogers	ASD/AW WPAFB, OH
Wallace E. Rook	Cerberonics Inc Falls Church, VA
Hal Rowland	Sundstrand Aviation Rockford, IL
Lawrence Schrader	ESL, Inc. Sunnyvale, CA
Allan D. Signor Panelist	USNSWSES Port Hueneme, CA
M. (Le') Smallin	Vought Aerospace Dallas, TX
Theodore H. Smith	Calspan Corp Arlington, VA

Roger A. Storms	Sperry-Univac St. Paul, MN
Roy Sugimoto	ASD/YPCD WPAFB, OH
Arn Thalhamer	NAVEODFAC Indian Head, MD
Bob Twitchell	Motorola Scottsdale, AZ
D. E. Williams	LMSC Bangor, WA

WORKSHOP #2 - ENGINEERING DRAWINGS

CHAIRMAN: Joseph R. Meitz
Delco Electronics Div.
General Motors Corp.

PANEL: Lorna Burns
Hughes Aircraft Co.

Albert Strow
Raytheon Corp.

Maurice Taylor
U.S. Army

Charles Fricke
Ford Aerospace & Comm Corp.

WORKSHOP #2 - ENGINEERING DRAWINGS

1. Q. Can requirements of a MIL-STD be referenced on a drawing in the same manner as the requirements of a MIL-Spec?

   A. Yes.

2. Q. What is the difference between a MIL-STD and a MIL-Spec?

   A. Generally, a standard depicts design standards or methods while a specification is for requirements. There are exceptions to both.

3. Q. Why does DOD-STD-100 go into such detail on drawing titles?

   A. Titles are extremely important to the government as they are an intrigal part of their Logistics System.

4. Q. Has any contractor developed a method of consolidating general and common notes on a separate document and then referencing that document on the product drawing?

   A. Yes. Many companies have notes peculiar to a product (i.e. printed circuit board, castings, etc.) stored in a computer file and make them a sheet of the drawing. Others do the same, but have identified the note sheet with a separate number and reference it on the using drawing. No one was aware of anyone who prepared a single document with all types of notes for different types of items in a single document.

5. Q. What is the status of the proposed revision of Y14.5 and will it be adopted for use by the DOD?

   A. No one at the meeting was sure of a date when the revision to Y14.5 will be issued. A guess was mid 1981. Like any new or revised standard issued, the revised Y14.5 document will be reviewed by the DOD and based on the services review a decision of whether to accept or reject the revision will be decided.

6. Q. Is there a spec or standard specifying requirements for the preparation of "Electronic Block Diagrams"?

   A. Check ANSI Y14.15 - 1966 plus supplements "A" and "S".

7. Q. Is there any effort being made to establish a DOD-STD note FLAG, e.g. Δ?

   A. Nothing is being done or planned to do on this subject. It would probably be resisted by industry.

8. Q. What is the procedure for ordering international standards?

A. If international standards are called out in a contract, they can be obtained from Government Printing House in Philadelphia, PA.

9. Q. Where can you obtain copies of ISO or DIN Standards?

A. They can be ordered from ANSI or directly from the originating country.

10. Q. What is the status of a proposed revision to MIL-STD-5480, that would clarify a "NON-DRAWING" copy?

A. The preparing activity stated that the standard will be changed and the word "NON" will be removed. No firm date of when the revision will be made was given.

11. STATEMENT: There is presently little effective control over the type of item procured via drawings. Many drawings are actually specifications but are hidden away in drawing files rather than having visibility of MIL-Specifications, etc.

COMMENT: This is a matter of choice by the requiring (DESIGN) activity.

12. STATEMENT: Limiting statements being placed in ANSI Documents by DOD, restricting the use of options in Industry Standards. EXAMPLE: ANSI Y32.16 - 1975 with the limiting statement makes that document the same as MIL-STD-16C. The only difference now is you have to buy the ANSI Y32.16 or obtain rights to reprint. If the government is going to embrace Industry Standards, they should do it without limitation.

COMMENT: The government has not done anything like the above example recently.

13. Q. Does MIL-Q-9858A (para. 4.1) & DOD-STD-100 (Chapter 500) apply to Data and Index lists?

A. Yes. Both documents require change control. Para. 4.1 of MIL-Q-9858 is not restricted to drawings; it covers data.

14. Q. Specification and/or Source Control numbers generated by a contractor - may they be called out on the parts list of their using assembly by the Spec and/or Source Control number?

A. Yes. Note 1 on page 92 of DOD Standard 100 C was revised by NOTICE 1 to DOD-STD-100 dated April 30, 1980. The note now agrees with the other paragraphs in the standard such as Para. 402.11.1.

15. Q. Should one use decimals or fractions with welding symbols?

A. ANSWER should be in ANSI/AWS A2.4 - 1979.

There were a series of questions that dealt with computer generated data which resulted in discussion more than definitive answers.

16. Q. How do you deliver a computer prepared drawing without signatures?

DISCUSSION: The following methods were stated:

1) Government accepts a stamp on drawing "Under Revision Control",

2) By "Verification Sheets" sign off, &

3) By adding a cover sheet which carries the signatures and revision status.

17. Q. What is today's "State of the Art" of a drawingless society- (e.g. Computer Graphics to numerical controlled end product hardware with in process inspection and acceptance customer)? Is anyone really doing this without hardcopy?

A. Within the commercial world this is being done. Isolated cases of government acceptance of computer generated tapes in lieu of hardcopy does exist.

18. Q. Is there a graphics computerized system in operation with the computer in a remote area (another city)?

A. Yes. There are many installations like that.

19. There were several questions relating to the difference between Level 2 and Level 3 as stated in DOD-D-1000.

REPLY: See attached #1.

ATTACHMENT #1

The intent of the Levels in DOD-D-1000 was to allow for progression of a data package through the various phases of a program. Although the standard is being interpreted as having three preparation levels of drawings, the intent is to have only two; those made to DOD-STD-100 and those not prepared to DOD-STD-100. The levels stated in DOD-D-1000 depict phases of a program and it was not intended that drawings in a Level 2 data package be made to a lesser quality or standard other than DOD-STD-100.

The drawings made for a Level 2 package are to be made to DOD-STD-100 and depicts the configuration as manufactured and to be delivered in a pre-production or limited production phase.

The difference between Level 2 and Level 3 drawing packages are the changes required to productionize the limited production or pre-production configuration. This may necessitate additional drawings, dimensional changes (Tightening Tolerances), additional notes, different types of drawings such as castings or wire harnesses, etc.

A report was made on the progress of the ADPA Spec & Source Control Drawings effort.

A subcommittee of the drawing section of ADPA has been working on a rewrite of this subject for the past 15 months and is ready to submit to the DOD their results. If accepted, it will replace the present sections now in DOD-STD-100 covering Specification and Source Control Drawings.

The subcommittee has been keeping the ANSI Y14.24 (types of drawings) informed of its efforts and has had that committee's unspoken support. The draft will be submitted to the government for its approval. It will also be submitted to ANSI Y14.24 for its approval. By this method, it is hoped to get our efforts adopted by the two primary drafting requirement specifiers.

Although we feel this rewrite will clarify the subject and be a considerable improvement over what presently exists, we know that it will still remain a controversial subject.

The work shop also resulted in the follow action items for the ADPA Drawing Requirements section for action:

1) Review for possible inclusion in DOD-STD-100 in the section on lists "wire lists" which would be prefixed "WL".

2) Review Para. 502.3 of DOD-STD-100 requiring upgrading existing drawings to latest standards when being changed which conflicts with other paragraphs in DOD-D-1000 & DOD-STD-100.

3) Review Para. 201.9.8.1 of DOD-STD-100 to reduce length of require "note" to allow use on "A" size.

4) Assist DOD in developing standards and requirements for delivery and acceptance of computer generated media, tapes, drawings, etc.

5) Review with DOD a method of tying together drawing requirements and specification requirements.

6) Review DOD-D-STD-1000 for added clarification of Level 2 and Level 3 data packages.

WORKSHOP #2 - ENGINEERING DRAWINGS

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Lou Bull
GTE Sylvania

Dan Burrs
FMC/NOD

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JCMPO/JCM-A-15
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WORKSHOP # 2 - ENGINEERING DRAWINGS (CONTINUED)
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WORKSHOP #3

ILS/TECHNICAL PUBLICATIONS

MEETING REPORT

WORKSHOP PARAMETERS - The ILS/Technical Publications Workshop was conducted from 1345 to 1615 on May 21, 1980, in classroom S-204, Cochrane Hall, Charleston Naval Station, Charleston, South Carolina. This workshop was a part of the Twenty Second Annual Meeting of the Technical Documentation Division, American Defense Preparedness Association.

Workshop #3 was attended by 15 participants (4 military and 11 industry representatives). The roster identifies each participant by name and affiliation.

OVERVIEW - The Workshop Chairman convened the session by presenting a brief report on the status of last years action items. Two areas of follow-up action were reported. The first area involved ADPA's offer to assist Army personnel in presenting the Skill Performance Aids (SPA) concept and implementation procedures in a series of 5-day workshops to be held at East Coast, West Coast, and Central cities. Since no further action is now anticipated, this workshop program has been dropped from the agenda. The second area involved assistance in the Technical Manuals Specifications and Standards (TMSS) program. The Program Plan for this effort was approved (reflecting our earlier comments) in January, 1980, and a copy of the plan was shown to the participants. This plan was developed and coordinated with the DOD Components and Industry by the U.S. Army DARCOM Materiel Readiness Support Activity, Lexington, Ky., the Lead Service Activity. Future action on TMSS tasks is anticipated.

In addition to the report of follow-up action, the Workshop Chairman highlighted the contents of two General Accounting Office (GAO) reports:

1. Report LCD-79-105/July 10, 1979, entitled "Improved Management of Maintenance Manuals Needed in DOD".
2. Report FGMSD-79-17/April 6, 1979, entitled "Federal Productivity Suffers Because Word Processing is Not Well Managed".

A copy of each report was shown to the participants and single copies of the reports (without charge) are available by requests sent to:

U.S. General Accounting Office
Distribution Section, Room 1518
441 G Street, NW
Washington, D.C. 20548

A copy of the 1 December 1979 Change 4 to TO 00-5-1 entitled "AF Technical Order System" was also shown to the participants. This change adds emphasis to the validation and verification phases of Technical Order System and reflects the Lessons Learned as presented at the 21st Annual Meeting by Maj. L. Nesbitt and discussed in the workshop session.

After the introductory report, the purpose and operating procedures for the workshop session were given. During the General Membership Meeting (Session 1 on May 21, 1980), "Question/Problem" forms were distributed to all attendees and the six ADPA workshops and workshop chairmen were introduced. As a result of this solicitation, Workshop #3 received one "Question/Problem" response that was used as the workshop issue for discussion. To prepare for the discussion, each participant in Workshop #3 was asked to identify individual background information such as name, affiliation, position, and brief sketch of applicable experience. The Workshop Chairman then stressed that each participant should contribute to the session as an individual rather than as a representative of the affiliated company or military service. Using this approach, the workshop objective was established as the resolution of the "Question/Problem" issue that would best serve American defense preparedness.

<u>WORKSHOP ISSUE</u> - PREMATURE ACQUISITION OF PRODUCTION DATA

QUESTION/PROBLEM: Why do the various government agencies continue to purchase and impose requirements for manuals and other ILS data, beyond what is really needed, to support equipment during R&D and Development phases of contracts? It appears to be a waste of money which could be better spent during pre-production and production phases, when equipment changes and re-designing have been relatively minimized. I feel

strongly that by doing this, more cost effective, usable, and accurate support data can be prepared.

DISCUSSION: This problem induced a thorough discussion of tailoring of specifications and standards to program needs. Reference was made to the TMSS Plan input from ADPA calling for attention to tailoring of requirements. Communication with ILS customer functional counterparts at the early contract stages (draft RFP stage) is essential to clarify intent and avoid misinterpretation. Alternate approaches are now encouraged by most RFP's. The climate for resolving such problems is much improved by use of life cycle cost analysis.

RESOLUTION: Implementation of tailoring techniques on a program need basis is now encouraged by DOD. This avenue of approach also provides increased communication capability with customer counterparts. A future ADPA seminar series on tailoring will add emphasis to this approach.

RECOGNITION: Special thanks are in order for the excellent setting provided by the Charleston Naval Station.

Also, the attendance and active participation of Russell C. Bain, Don R. Grubb, and Rosalyn T. Sledd did much to achieve the communication level that was realized. Although not established as a formal panel, these participants formed the backbone of the workshop session.

WORKSHOP #3

ILS/TECHNICAL PUBLICATIONS

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Rosalyn T. Sledd	Naval Air Tech Serv. FAC
Donald M. Kievet	Stencel Aero Eng.
Don R. Grubb	E G & G Washington Analytical Services Ctr.
Patrick Hinds	Aerojet Electro Systems
Kendall Hopkins	RCA, Automated Systems
Jörg Marbach	Embassy of Switzerland
Leon Snodgrass	E G & G, Inc.
Mary Kennedy	USAF-AFCMD/SA
Peter J. Calamore	Pratt & Whitney Aircraft GPD
Lawrence E. Stockett	Research Triangle Institute
Edward J. Bastek	Motorola (GED)
Lawrence D. Harty	INSGROUP, Inc.
Lawrence E. McGauley	TRW
Russell C. Bain	NSWSES (5730)

WORKSHOP # 4
CONFIGURATION MANAGEMENT
22nd ANNUAL MEETING

TECHNICAL DOCUMENTATION DIVISION
of the
AMERICAN DEFENSE PREPAREDNESS ASSOCIATION

Charleston, South Carolina
Thursday, May 22, 1980

Chairman: Mr. Roger A. Storms
SPERRY UNIVAC
DEFENSE SYSTEMS DIVISION
Univac Park, M.S. U1K15
P.O. Box 3525
St. Paul, Minn. 55165

PANEL MEMBERS: Mr. John F. Bowers
Northrop Services, Inc.
1700 North Lynn Street
Arlington, Va. 22209

Maj. Phil Merkley
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Andrews AFB, D.C. 20334

Mr. Joseph J. Lelevich
Naval Air Engineering Center
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Mr. Albert R. Strow
Raytheon Company
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Bedford, Ma. 01730

PURPOSE -

The purpose of the Configuration Management Workshop was to utilize the knowledge gained by the government and industry panel members and workshop participants who work with and apply the Configuration Management discipline on a day-to-day basis to improve communications regarding CM matters between government and industry. The objective of the workshop was to identify and resolve CM problems which are currently being experienced by the attendees through questions raised by the participants and answers posed by both the panel and the attendees.

SUMMARY -

Sixty seven individuals attended the workshop. See attached list of Attendees.

Mr. Roger Storms opened the workshop and introduced the government/industry panel. The workshop was then opened for questions, the first three questions being previously written and submitted.

Questions and Answers

1. What is the impact on CM of concurrent/parallel Development & Production Phases?

   - It is a way of life. There is never a program that really runs in series - there is by necessity development and production at the same time and this is really one of the reasons that C/M was developed. There is really no fixed answer to this. Every CM program must be adjusted/tailored to fit to the program/project. Industry has by and large learned to apply the CM Discipline in this mode to allow the development schedules to be reduced. In regard to FCA's/PCA's, there are more audits of parts of the system instead of one audit of the total system.

2. a) At what point in the development cycle should a Part I Specification be authenticated?

   - At the Preliminary Design Review (PDR) - It should be held off until the requirements are completely defined to prevent a flood of Class I ECP's against the specification.

   b) Can ECP's be written against an unauthenticated Specification?

   - No, until it is signed and released there is not a requirement for the baseline to change.

   c) What does authentication mean?

   - It is the same as approval, and can be accomplished per many procedures as defined in the applicable contract Statement of Work (SOW).

   d) Can an unnumbered, undated, unauthenticated, unsigned specification be placed on contract?

   - It shouldn't. This would produce contractual problems and questions and it is hard to believe that a contractor would accept such a specification contractually to define his development requirements.

3. Whatever happened to VECP's?

   - They are alive and kicking.

   - DCAS Districts now have goals to get a number of these out each year.

   - Some company's find it better politically not to suggest reducing requirements to the engineer who originally established them.

   - VECP's are alot easier to get approved on Production Contract versus Development Contracts.

4. <u>C/M Plans</u> - Has anyone ever written a CM Plan that really tells it like it is?

- Absolutely.

- Plans are usually written to comply with RFP requirements; if a customer wants details, he gets details; if he wants generalities he gets generalities.

- It was suggested that the DOD C/M committee should take this as a task to come up with the <u>format for a standard C/M plan</u> (Ref: MIL-STD-1456). Answered that this is a debatable suggestion with equally vocal supporters and detractors.

5. Where does the Configuration Management organization report in industry?

- Per the sample of industry attendees at the CM Workshop:

  62% Engineering
  15% Contracts
  12% Quality
  11% Other

6. What is status of Substitute Parts List per DOD-STD-480A, Paragraph 4.1?

- At about the time of the last Annual meeting, DOD-STD-480A hit the street with Parts Substitution List included for the first time. This was to be the conclusion of over five years of effort by industry to get government part substitutions recognized. However, somewhere in coordination it didn't come out the way industry or the government had intended. DOD-STD-480A ended up requiring that the list be a formally controlled part of the drawing package and be submitted to the government. A large portion of industry came back and wanted dollars to generate, maintain and submit the government part substitution list. Both government and industry were unsatisfied.

- The DOD-STD-480B draft will propose correcting this problem by modifying Paragraph 4.1 by deleting all words following, "A list of all part substitutions shall be prepared by the contractor."

7. What are the proposed changes being incorporated in the draft of DOD-STD-480B?

- Parts substitution list requirement being changed to delete the formal list.

- SCN processing being incorporated including form and form preparation instructing.

- Software being addressed more than just generally.

7. (Continued)

- Class I ECP 1692 form (Para. 4.6 and Figure 1) to be related to base lines instead of program phases.
- Deviations to be applicable for a "period of time" or, as now stated, for a "quantity".
- Omnibus DID to be developed for D/W's, ECP's, SCN's and NOR's.

CONTINUING ACTION ITEMS

Mr. Charles J. Embrey will supply updated joint DOD CM standardization Program drafts of documents for comment, as they become available.

CONFIGURATION MANAGEMENT
WORKSHOP NUMBER 4

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AD-A169 665 PROCEEDINGS OF THE ANNUAL MEETING OF THE TECHNICAL DOCUMENTATION DIVISION..(U) AMERICAN DEFENSE PREPAREDNESS ASSOCIATION WASHINGTON DC MAY 80

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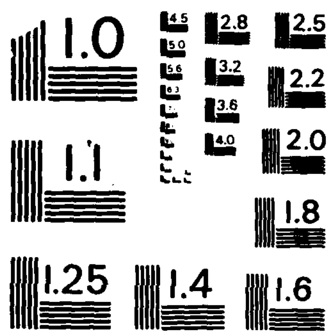

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NATIONAL BUREAU OF STANDARDS - 1963 - A

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AMERICAN DEFENSE PREPAREDNESS ASSOCIATION
22nd ANNUAL MEETING-TECHNICAL DOCUMENTATION DIVISION
MAY 21, 22, and 23, 1980

SPECIFICATIONS AND STANDARDS WORKSHOP
MAY 22, 1980
1315 - 1630

S. Alvine, Jr., Chairman
Singer Company
Kearfott Division
Wayne, N. J.

W. A. Moran, Substitute Chairman
McDonnell Douglas Corporation
Douglas Aircraft Division
Long Beach, Calif.

This year's workshop took on a rather unorthodox format, due mainly to the lack of a planned agenda. Unfortunately, Mr. Alvine's unavoidable absence did impact the sense of continuity from last year's workshop and the subsection's activities over the past year. His presence and professional administration were sorely missed. This writer, acting as substitute chairman for Mr. Alvine, decided upon an unstructured, informal, person-to-person dialog between the approximately twenty attendees to this year's workshop.

After some brief preliminary introductory remarks, there was a summary recap of last year's action items and to the extent of our combined best information, a status of these important items:

1. Notwithstanding industry's rejection of the initial draft DOD-STD combining MIL-STD-490 and -961, it was announced from several areas that a new effort is being mounted to attain the same objective for eliminating redundancies between the two Standards. This subsection intends to monitor and assist in this effort to the extent privileged, and will render appropriate services expeditiously.

2. The long awaited revision of MIL-STD-490 may be in the wings once again. Discussing this topic with AF personnel, it was learned that Major Phillip C. Merkeley of Headquarters USAF Systems Command, Andrews AFB, is replacing Major D. Rhoads (of the same organization) who has been given new assignments.

3. Draft revision of DoDD 4120.21 still hasn't been fully coordinated and made ready for official release. This is an important top tier directive impacting our many standardization efforts.

4. Still no official word or status on the MIL-STD-961A draft which was reviewed and reported on over a year ago.

Again this year the workshop environment highlighted the continuing need for improved communications within and/or between industry and Government, both on an organizational basis and as individuals analyzing requirements and managing cost-effective application of standardization projects.

Once again our favorite perennial topic took considerable time -- spec preparation in accordance with MIL-STD-961, or in accordance with MIL-STD-490 -- which? The writer gave a summarized historical review of MIL-STD-490's evolution in relation to the systems management concept and its application to major weapons systems acquisition. This summary was then compared to the contrasting environments where MIL-STD-961 would more appropriately apply. Some clarification of basic misunderstandings of the specific parts these two MIL-STDs play in the acquisition process were made; however, much more time would have been required to finitely conclude this topic to everyone's complete satisfaction.

Some concern and attention was given to the current trend of contracting for computer program specifications. Air Force use of MIL-STD-483, and USN's use of MIL-STD-1679 hardly exemplifies standardization in this crucial area of weapon system technical documentation.

Many attendees were very interested in the subject of specification tailoring and the various methods available to achieve benefits therefrom. Concern over chain referencing of requirements via the referenced document citing other documents of which each in turn cites its own chain of references. How to limit the contractual obligations of these successively tiered requirements became the issue. Several methods were explained by the chair which interested some who face this problem frequently.

Metrication's impact on spec preparation, application, and tailoring was discussed briefly. This was a topic that all attendees perceived as an issue that will inevitably require full attention, but until some trial balloons have been raised, case by case consideration appears to be the most practicable approach.

Some candidate subjects suggested by the workshop for the subcommittee to treat in the ensuing year include:

1. Revision of MIL-STD-490, to incorporate at least those "specification" items and criteria now contained in MIL-STD-483; and deletion of requirements that are redundant to other Government requirements documents.

2. Sponsor a dedicated effort toward the integration and standardization of MIL-STD-1679 and MIL-STD-483 Computer Program Spec preparation and maintenance requirements for incorporation as Appendixes in MIL-STD-490.

3. Prepare/publish subcommittee charter and descriptions of functions and responsibilities pertaining to:

   a) Specs - Preparation and Maintenance
   b) Specs - Application and Tailoring
   c) Standards -

4. Publish an information brochure on the subject of MIL-STD-490 vs. MIL-STD-961 specs, their proper place in the DoD system, and industry's versus the military's involvement.

Walt

W. A. Moran

SUMMARY OF WORKSHOP No. 6

Engineering Data Automation

Mr. Gerald T. Durbin, Chairman

Mr. Frank W. James, Co-Chairman

WORKSHOP NO. 6

ENGINEERING DATA AUTOMATION

The 15 Industry and 6 Military personnel who participated in this workshop identified the following general areas for discussion:

a. Development of technical data using automated methods.

b. Computer aided design/manufacture interfaces.

c. Automated storage and retrieval methods.

d. Media for delivery of automated data to customers.

It was generally agreed that the most significant problems in the implementation of automated systems are:

a. The lack of adequate national standards in the areas identified for discussion.

b. Implementation of automated systems within our respective organizations without sufficient coordinated planning.

c. Compliance with existing specifications for technical data that do not consider the impacts of automation.

d. Failure of many suppliers of "turn-key" systems to comply with requiements normally imposed by DoD.

Other problems that were identified included:

e. Education and retention of trained personnel.

f. Legibility of certain outputs. (DoD will not accept electrostatic plots; instead use of vector plots or computer output microfilm, COM, is recommended. Exceptions to MIL-M-9868 to permit the use of COM are being authorized by the Preparing Activity for that specification.)

Mr. Durbin described several systems for the storage and retrieval of technical data including lazer digitizing on microfiche and disk and voice recognition systems. He identified the need for software coupler between CAD and COM systems. Several manufacturers are working on the problem, but there is still no industry standards.

It was generally agreed that the following action items should be pursued during 1980:

a. Continue working with ANSI Y14.26 Subcommittee in the development of national standards.

b. Develop a case study of a typical company using automated engineering data, including problems and economic analysis, for discussion at the next ADPA/TDD Annual Meeting.

WORKSHOP NO. 6

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ADPA TECHNICAL DOCUMENTATION DIVISION
22ND ANNUAL MEETING

ATTENDANCE ROSTER

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